INTERNATIONAL ABSTRACT OF SURGERY

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PRINCIPLES OF SURGICAL PRACTICE

CHOICE OF ANESTHESIA

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THE main factors to be considered in making a choice of anesthesia are its safety and efficiency and its comfort for the patient. Safety is naturally the most important consideration and overshadows all other considerations. However, that anesthesia which is safest when considered alone and by itself may, if it does not facilitate the work of the surgeon, be more dangerous, when the whole procedure is considered, than some other more efficient anesthesia. After all, the final objective of any operation is the relief of a surgical condition, and any anesthesia which does not efficiently contribute to this is probably less desirable than one which promotes surgery and makes it safer. Thus, the efficiency of the anesthesia may come to be a large factor of its safety. This is true particularly in the abdominal region. Comfort of the patient is, of course, always desirable and should be promoted whenever possible, but if it interferes with the safety of the anesthesia or the full and safe accomplishment of the surgical procedure, it should be subordinated to these two.

In general, the safest anesthesia is that which interferes least with the normal physiological processes of the body and produces the least harmful effect on the vital organs. The safety of any anesthesia may, however, vary decidedly according to a good many factors, so that, while it may be the safest choice in one case, it might be quite far from safe in another case.

On the whole, the anesthetics which are least harmful in themselves are the local acting anesthetic drugs, which are used in local, regional, epidural, and spinal anesthesia. They do, however, produce some harmful effects. These effects are of two types which should be clearly distinguished:

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1. In local and regional anesthesia there are systemic effects which are due to absorption of toxic amounts of the drug into the circulation.

2. In spinal anesthesia, while there is still disagreement as to the exact mode of the production of these effects, the weight of opinion leans to the view that absorption into the circulation is not usually an important consideration. Thus, drugs showing the least toxicity on absorption into the body should be used for regional anesthesia, while some having a more toxic action are allowable for spinal anesthesia.

The safest drugs for regional anesthesia are, therefore, novocaine and metycaine, the latter being somewhat more efficient and longer acting, though also slightly more toxic. Pontocaine and nupercaine are more toxic and, therefore, less safe for this purpose. Nupercaine in particular has a toxic action on the heart which is quite dangerous.

In spinal anesthesia the situation is very different. Here absorption of toxic amounts is not an important factor, probably because the total dose is so small, and drugs may, therefore, be used which are too toxic for use in regional anesthesia. The use of pontocaine and nupercaine is therefore allowable and, moreover, has certain important advantages for spinal anesthesia. These anesthetics appear to have a less pronounced effect on the vasomotor system than novocaine and metycaine and, clinically, produce less vascular depression than the latter drugs, especially in relation to the length of anesthesia. Moreover, the much more prolonged anesthesia which they produce is of separate and distinct advantage in itself.

Thus it appears to us that novocaine and metycaine are preferable for local and regional anesthesia, and pontocaine and nupercaine are preferable for spinal anesthesia.

Local and regional anesthesias, while inherently safe, have a number of disadvantages in their practical application; sometimes their safety is considerably decreased. Occasional cases of idiosyncrasy are encountered in which the patient shows such extreme sensitivity to the toxic action of the local acting drugs that death may result from the anesthesia alone. The anesthesia may be so inefficient that the surgeon is hampered and restricted in his work and his attention is distracted by discomfort of the patient. The patient may be uncomfortable, nervous, and restless during both induction and operation.

Epidural anesthesia is in reality a form of regional anesthesia and is called epidural anesthesia simply because of the location in which this regional anesthesia is applied. The dose of the drug is comparatively large and there is, therefore, an important amount of absorption into the general circulation. A toxic drug such as pontocaine or nupercaine is therefore not desirable as the sole anesthetic agent. While we have used this method in but a few cases and therefore cannot speak from personal experience, it appears to us less desirable than spinal anesthesia. The induction period is very much longer, the dose of the anesthetic drug is far larger, and it is not invariably effective.

Spinal anesthesia might also be called a form of regional anesthesia since it produces its effect by blocking the conductivity of the nerves. The drugs act, however, on the nerve fibers at a point where they are devoid of any sheath, and therefore, as they do not have to penetrate the sheath, they have a much more rapid and potent effect. When compared with the various forms of regional anesthesia, the dose required is extremely small. It is, therefore, a very valuable form of anesthesia because of its high efficiency and lack of disturbance to normal physiological processes or of harmful effects on vital organs. Extensive anesthesia may be produced by means of but a single puncture and a comparatively small amount of the drug. It is rapid, certain, and effective, and postoperative recovery is excellent. Thus, it is often the preferred choice of anesthesia in situations in which it is applicable.

It has, however, been the subject of much controversy and has been criticized severely by some on the score of its danger and of its limited and sometimes too short period of action.

The first objection has been greatly lessened by the recent advent of the drugs pontocaine and nupercaine, and by many improvements in technique and management. Moreover, the danger varies so much under different circumstances, such as the competence of the anesthetist, the height and duration of the anesthesia, and the condition of the patient, that no unqualified assertions are justified.

The second objection has been greatly lessened by the advent of these two drugs, which will produce anesthesia, if necessary, up to approximately three hours.

The necessity for a well qualified anesthetist should be particularly stressed, as this is a form of anesthesia in which this is of more importance probably than in any other. Not only should the anesthesia be administered correctly, but it should be overseen carefully and competently during its entire course. Treatment of untoward conditions as they arise is extremely effective and its omission or improper performance certainly converts this anesthesia into a most dangerous procedure.

With this proviso, that it is administered and watched by an anesthetist competent in this particular field, it may be said that low spinal anesthesia, namely, below the level of the abdomen, is eminently safe and can be made to outlast an operation of any conceivable length.

When the height of anesthesia begins to encroach on the abdomen, depressive effects become more evident but are still slight if only the suprapubic region is included. The most marked effects occur when the whole abdomen is anesthetized, but even then they are not so great as to prevent its employment in any but the most enfeebled patient, especially if the operation is short and the amount of the drug, therefore, small. Here the increase in safety of the operation often overbalances the increase in danger of the anesthesia when the latter is considered alone.

GENERAL ANESTHETICS

The general anesthetics may be divided into inhalation anesthetics and non-inhalation anesthetics.

Inhalation anesthetics. There is considerable variation in toxicity and efficiency between the members of this group. Their arrangement roughly in ascending order of their toxicity is as follows:

Nitrous oxide
Ethylene
Ether[1]
Cyclopropane[1]
Vinyl ether
Ethyl chloride
Trichlorethylene
Chloroform

While the order of this arrangement is fairly evident in a general way, there is much room for

[1]Ether is followed by more after-effects, but cyclopropane is more dangerous during administration, and has therefore been considered as more toxic.

dispute in the actual details. For instance, nitrous oxide while apparently least toxic in itself, is often accompanied by so much anoxemia that in its clinical application it is apt to be more toxic than ethylene unless it is used with some other anesthetic to decrease the anoxemia. Occasional deaths have taken place on the table from the anoxemia of pure nitrous oxide-oxygen; and serious cerebral damage has been caused.[1] Nitrous oxide is one of the anesthetics the danger of which varies very greatly with the competence and experience of the anesthetist. Ethylene, according to laboratory investigation and its clinical application in many hundreds of thousands of cases, has proved to be one of the safest drugs at our disposal, but its use is accompanied by a mild degree of anoxemia, though less than that with nitrous oxide, and it has received much undeserved notoriety because of explosions which have taken place, some of them fatal to the patient. None of these, however, as far as I am aware, has occurred with ordinary anesthetic mixtures of the drug. Many more explosions have taken place with nitrous-oxide ether than have occurred with ethylene or cyclopropane. While this may be due to the more frequent use of nitrous oxide, it shows the explosibility of this mixture and the necessity for as great care when using it as when using ethylene.

The toxic effects of these drugs may vary according to the characteristics of the patient. For instance, cyclopropane has a distinct, toxic action on the heart, while vinyl ether has some toxic effect on the liver. The toxicity of one of these for a given patient would, therefore, vary according as he had a damaged heart or a damaged liver. The exact action of trichlorethylene has not been definitely determined, but the close relation of its chemical structure to that of chloroform suggests a strong possibility of some toxic action on the liver and vascular system.

The toxic action of all these drugs is very much greater in a deep plane of anesthesia than in a light one. I have noticed this difference particularly with ordinary ether and with cyclopropane. Here the difference is so marked that when the same anesthetic is employed at different depths it seems as if different anesthetics were being used. A truly light plane of ether anesthesia even of considerable length, from two to three hours, causes surprisingly little disturbance either during or after anesthesia, while a deep plane, as frequently employed, increases the susceptibility of the patient to shock, and is followed by depression, nausea and vomiting, upset of the acid-base balance, interference with the metabolism of sugar, and lowering of the function of the liver and kidneys. Similarly with cyclopropane, a truly light plane of anesthesia has almost no disturbing effect on the patient either during or following anesthesia, except occasionally a tendency to nausea and vomiting, while a deep plane tends to cause irregularity of the pulse with extra systoles during anesthesia, and is followed by depression, nausea and vomiting, and often a sharp drop in blood pressure. It does not, however, show a toxic effect on the liver or kidneys. These two drugs are, therefore, excellent for use in a light plane of anesthesia or in combination with other anesthetics, but are not so well suited for use in a deep plane.

The drugs near the end of the list, vinyl ether, ethyl chloride, and trichlorethylene are all so toxic that it is best to limit their use quite strictly. With vinyl ether the anesthesia should be either very light or rather short (less than three-quarters of an hour), preferably both. Within these limits it is very useful for such short procedures as induction of ordinary ether, paracentesis, removal of packs, and so forth. Since it is quite portable it may be preferable to the gases when this quality is important. Ethyl chloride affects the vascular system and is, therefore, less safe than vinyl ether. Trichlorethylene is little known and untried, its sole claim to attention being that it is non-inflammable and therefore may be of use in a few cases in which an uncontrollable source of ignition, such as x-rays, is close at hand. Chloroform is so dangerous to the heart during anesthesia and to the liver after anesthesia that it had best be avoided entirely.

Non-inhalation anesthetics. This group includes various drugs which may be used as rectal anesthetics, such as avertin, some of the barbiturates and paraldehyde, and various ones which may be used as intravenous anesthetics such as sodium n-methyl cyclohexenyl methyl malonyl urea (evipal), sodium ethyl 1-methyl butyl thiobarbiturate (pentothal), and paraldehyde. Their chief advantage is that they are entirely non-inflammable and so are perfectly safe as far as danger of fire or explosion is concerned even under such unfavorable conditions as accompany the use of surgical diathermy or x-rays. They have the additional advantage that they are followed by comparatively little postoperative upset, especially nausea and vomiting.

As a group they are not so directly under the control of the anesthetist as are most of the inhalation anesthetics. This is true particularly when they are used rectally. Consequently, in rectal

[1]Courville, C. B.: Asphyxia as a consequence of nitrous-oxide anesthesia. Medicine, 1936, 15:129-245.
[1]Lowenberg, K., and Zbinden, T.: Destruction of the cerebral cortex following nitrous-oxide anesthesia. Anes. & Anal., 1938, 17:101-108.

anesthesia the dose should not be large enough for complete anesthesia, except in a very few instances when only an extremely light plane suffices. Almost invariably it is best to use them only for pre-operative medication or for basal anesthesia. An inhalation anesthesia used in addition provides the necessary control. Used in this way in sufficiently small doses they are safe, they allay nervousness, and decrease the amount of inhalation anesthesia necessary and thus decrease postoperative upset. In particular, they allow the use of nitrous oxide without the necessity of any or more than slight anoxemia.

The intravenous anesthetics, though less controllable than most of the inhalation anesthetics, are considerably more controllable than the rectal anesthetics. With rectal anesthetics, when the enema has once been given, absorption continues for some time even though no more of the anesthetic is given. With intravenous anesthetics, on the other hand, absorption stops the instant administration stops, and, since most of these drugs are broken down quite rapidly, anesthesia begins to recede as soon as administration is stopped. Indeed, with evipal and pentothal the rapidity of control appears to approximate that with ether. There is, however, one qualification to add to this. It is possible that if a patient goes into shock, lightening of the anesthesia may be considerably delayed. The use, therefore, for complete anesthesia in cases in which shock may supervene is debatable.

REGION OF THE BODY

The appropriateness of any given form of anesthesia is modified decidedly by the region of the body to be operated upon, whether it be the trunk and extremities, exclusive of the abdomen, the head and neck, or the abdomen.

Trunk and extremities, exclusive of the abdomen. These are usually the easiest regions with which to deal since deep anesthesia is seldom needed and there is little or no interference between the surgeon and anesthetist. There is, therefore, a wide choice of anesthesia, almost any of the general or local acting anesthetics being on occasion reasonably acceptable. Local and regional anesthesia are excellent when they are readily applicable. However, if the patient is nervous or apprehensive, especially when multiple punctures are necessary during induction, a general anesthetic may be preferable. Local infiltration or field block is well suited for the removal of small tumors or even for simple mastectomy. Brachial-plexus block is effective for the arm, forearm, and hand, except portions of the upper arm; and induction is not too uncomfortable for the patient. Caudal anesthesia is usually effective for cystoscopy, and the one puncture necessary is not too uncomfortable. It is not sufficient, however, for cystoscopy in painful bladder conditions and is uncertain for anal operations. Trans-sacral anesthesia is effective for operations on the external genitalia, for anal operations, and for cystoscopy in many painful bladder conditions. It is not entirely satisfactory for transurethral prostatic resection. However, it requires multiple punctures which are often quite distressing to the patient; there is often evidence of toxic absorption; and, like caudal anesthesia, it is not without danger unless expertly given.

For these various reasons, therefore, we usually prefer low spinal anesthesia. This requires but one injection and is, therefore, acceptable to the patient. It is rapid and certain and requires but a tenth or less of the dosage necessary for transsacral anesthesia. It has the disadvantage, however, that the patient must usually lie flat in bed for at least twenty-four hours after puncture in order to avoid postpuncture headache.

Almost any one of the general anesthetics may be used for the trunk and extremities, especially if with the more potent ones but a light plane of anesthesia is used. I would like to emphasize once more, and strongly, the difference in postoperative upset between deep anesthesia and light anesthesia.

Combinations of anesthetics are very satisfactory for the trunk and extremities, as in many other parts of the body. Nitrous-oxide ether is commonly used. We prefer nitrous-oxide cyclopropane unless a deep plane of anesthesia is necessary. With 50 per cent nitrous oxide as the basis, 10 per cent to as low as 2 per cent cyclopropane gives very satisfactory results.

If diathermy or x-ray is to be used, one of the non-inflammable anesthetics, such as a rectal anesthetic combined with nitrous oxide or an intravenous or local acting anesthetic should always be used. Here intravenous anesthesia is very useful.

Occasionally, deep, muscle relaxing anesthesia is necessary. When but a short period is needed, as in manipulations of the shoulder or back, intravenous pentothal is most excellent. Induction is very rapid, muscular relaxation is excellent, and postoperative upset is slight. The same anesthesia may also be used for procedures of several hours, but if muscular relaxation is needed over this period, spinal anesthesia is preferable in the lower extremities and one of the combinations of anesthetics elsewhere, as it is questionable whether

such deep anesthesia with pentothal should be maintained over a long period. Intravenous anesthesia with pentothal or evipal may, however, be carried on for several hours if but a light plane of anesthesia is sufficient. For procedures on the lower extremities when muscular relaxation is needed, as in tendon transplantation and operations on the femur and hip joint, spinal anesthesia is excellent. Prolonged anesthesia is easy to obtain at such low levels; the effect on blood pressure is minimal; muscular relaxation is extreme; and postoperative upset, even after several hours of operating, is comparatively slight.

Head and neck. Here, also, but a light plane of anesthesia usually suffices, but the fields of the surgeon and the anesthetist are so close together that the use of the ordinary surgical mask is often impossible. Local and regional anesthesia are, therefore, frequently of value. Field block is simple and effective for operations on the scalp, cranial vault, and brain. Work on bone, however, is unpleasant to the patient, and in brain surgery the prolonged maintenance of one position with other discomforts, frequently makes a general anesthetic advisable.

In all these operations about the head under general anesthesia, intravenous as well as inhalation, it must be remembered that provision must be made for maintenance of unobstructed breathing during operation.

For brain surgery, ether vapor with an intratracheal catheter is quite satisfactory and adequate airway is assured. The flow of anesthetic is accurate, a comparatively light plane of anesthesia suffices, and postoperative recovery is good. Preliminary avertin is probably of advantage, if the patient is not a poor risk, in lessening the amount of ether necessary, in decreasing intracranial pressure, and in decreasing the patient's apprehension beforehand.

Virtually all nose and throat operations may be done to advantage under local and regional anesthesia if sufficient preliminary narcosis is obtained. Here the retention of the cough reflex is of value. In the young and apprehensive, ether vapor by pharyngeal insufflation is simple and effective, or one of the gases may be used by the intratracheal route with carbon-dioxide absorption. The intratracheal catheter, preferably with a cuff, should always be used if there is danger of inhalation of blood or detritus.

In operations on the anterior aspect of the neck, cervical plexus block is effective and is valuable in operations like esophageal diverticulum when the patient's coöperation may be helpful. The procedure of induction, however, is somewhat uncomfortable for the patient and time-consuming; and as the surgical mask is not ordinarily in the way, for most operations in this region one of the gases is usually most practical. If the surgical mask may be in the way, as in some operations for thyroglossal cysts, intratracheal anesthesia with one of the gases, or possibly pharyngeal insufflation with ether vapor should be used. In thyroid operations when there appears any possibility that there may be obstruction to breathing from pressure on the trachea or paralysis of a vocal cord, an intratracheal tube should be used, simply as an airway, and the surgical mask may be placed over it. Inhalation anesthesia with one of the gases in a closed system is of considerable value if obstruction to breathing unexpectedly develops in the course of one of these operations. A high concentration of oxygen may then be used, pressure may be employed, and, if necessary, intratracheal anesthesia may be quickly instituted.

Abdomen. With operations in the abdomen, conditions are entirely different from those in the two regions just discussed. Deep muscular relaxation is almost an essential for safe and effective surgery, and quiet breathing is very desirable, especially for operations in the upper part of the abdomen.

Local and regional anesthesia fulfill these conditions nicely, but it is practically impossible to make the field of anesthesia sufficiently large to permit of free operation and exploration. Nitrous-oxide anesthesia used alone is entirely inadequate; ethylene is only slightly better, and cyclopropane, while much better, also fails to provide the best operating conditions, and is too toxic for such depth and such length as are usually required. Ether is the sole inhalation anesthetic which alone approaches adequacy. However, unless extreme depth is maintained, relaxation is not complete, and breathing is stimulated. If sufficient depth for really satisfactory conditions is maintained, especially for a considerable period, the toxic qualities of the drug are greatly enhanced.

There are a number of combinations of anesthetics which are fairly satisfactory. One which we have employed many times with considerable satisfaction consists of preliminary avertin; nitrous oxide or cyclopropane with ether by the intratracheal method, with carbon-dioxide absorption; and abdominal field block. The sum of the effect of these various agents produces sufficient effect without the necessity of any one drug's being pushed to the point of producing any marked toxicity of its own. Field block produces local relaxation without the necessity of deep general anesthesia. The intratracheal tube and carbon-

dioxide absorption promote easy, quiet breathing without straining.

No other method of anesthesia, however, produces such satisfactory operating conditions as spinal anesthesia. Muscular relaxation is complete; breathing is quiet; and in addition the intestines are contracted, a factor which may be of considerable advantage, and which is not produced by any general anesthetic. Moreover, it has the advantages of the local acting anesthetic drugs in that postoperative upset is minimal. The newer drugs and methods, pontocaine and nupercaine, with careful dosage, intravenous infusion with ephedrine, oxygen inhalation and other procedures of value have practically abolished the old fear of collapse or too short anesthesia. Spinal anesthesia is invaluable in abdominal surgery, and unquestionably, when properly employed, saves lives and enables better surgical results to be obtained. Its value, however, is somewhat decreased by the fact that, probably more than any other anesthesia, it requires the services of an anesthetist well trained and experienced in this particular field.

Epidural anesthesia is in many ways similar to spinal anesthesia, but, as stated above, appears to us to be inferior to it.

CONDITION OF THE PATIENT

The condition of the patient frequently has a decided influence on the choice of anesthesia, but these influences have already been to a large extent mentioned in discussing the various anesthetics.

With patients whose general condition is poor, the most toxic and depressing anesthetics should be avoided. The local anesthetic drugs should be employed when the resulting anesthesia is effective for the proposed operation. Therefore, low spinal anesthesia is excellent and may be used with patients in very feeble condition, even for levels as high as for suprapubic operations. A high spinal anesthesia, however, is usually too depressing for very feeble patients and in abdominal surgery should give place to a well chosen combination of anesthetics given by the intratracheal method with carbon-dioxide absorption. When the operation is to be of quite limited extent, as for gastrostomy, enterostomy, or cholecystostomy, abdominal field block is most excellent for these patients. In other regions a very light plane of anesthesia, with one of the simple combinations usually suffices.

Heart disease. Valvular heart disease influences very little our choice of anesthesia if the defect is well compensated, and even with some degree of failure has surprisingly little effect. With well marked failure, however, and especially with myocardial damage, danger is greatly increased. Here the local acting drugs are indicated when efficient, if the patient is of equable or stolid temperament, but if he is nervous or excitable, a general anesthetic is preferable. A light plane of anesthesia is quite acceptable either with ether, cyclopropane, or a combination of anesthetics, or with intravenous anesthesia. Marked changes of blood pressure should be avoided, especially with coronary disease. Deep cyclopropane and to a less extent, deep ether anesthesia should be avoided. Patients with angina pectoris practically always do well under a light general anesthesia, but may succumb to an attack as activity is resumed during convalescence.

With liver disease, the most toxic drugs, such as vinyl ether, trichlorethylene, and chloroform, should be entirely avoided and ether should be used in but a light plane. Cyclopropane and local acting drugs are preferable. Those drugs, also, which are detoxified in the liver, such as avertin and the barbiturates, should be avoided.

With kidney disease the indications are much the same. The preliminary use of morphine has some protective influence against toxic effects, at least those of ether.

Lung disease does not appear to be specifically affected to a marked degree by the anesthetic employed, but rather by more general influences such as the site and length of operation, the presence of infection, chilling of the body, and other depressing influences. The choice of anesthesia should, therefore, be similar to that for any patient in poor condition, with an avoidance of anoxemia and of toxic anesthetics in a deep plane of anesthesia.

SUMMARY

The various anesthetics have been discussed from the standpoint of their safety and efficiency, and some of their more suitable uses have been suggested. Regional anesthesia is usually safe but often ineffective. Spinal anesthesia presents a unique combination of high efficiency and low general toxicity, but is dangerous unless competently applied. The more toxic inhalation anesthetics should be used in a light plane, and the most toxic used briefly or not at all. Combinations of anesthetics are extremely useful. The non-volatile general anesthetics are useful chiefly because thev are non-inflammable, but are useful also in combinations.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Spaeth, E. B.: Ptosis and Its Surgical Correction. *J. Am. M. Ass.*, 1937, 109: 1889.

Blepharoptosis is the inability to raise the upper lid owing to paralysis or paresis of the musculus levator palpebræ superioris. It may be congenital, may follow trauma, may be a part of the residual condition of inflammation of the orbit, or may be a part of a complete or incomplete external ophthalmoplegia, either central or peripheral in origin. Surgical ptosis should be considered as any one of these conditions when it is stationary, cannot be corrected by any medical treatment, and impairs vision. A correct diagnosis as to the character of the ptosis and an exact estimate of its degree are prerequisites to a satisfactory outcome.

The basis of all surgery for ptosis exists in the utilization of the levator palpebræ superioris, the occipitofrontalis with the corrugator supercilii, and the superior rectus, either individually or together.

Four general procedures are available: shortening of the eyelid itself, advancement or advancement with resection of the levator, replacement of the levator by the occipitofrontalis, and the utilization of the superior rectus. The selection of the operation to be used in an individual case is perhaps the most important factor in ptosis surgery. The utilization of one or more procedures in a single case is not at all uncommon, especially when complicated forms of ptosis are to be corrected.

The author describes and discusses the various techniques. SAMUEL KAHN, M.D.

Dvorak-Theobald, G.: The Neurogenic Origin of Choroidal Sarcoma. *Arch. Ophth.*, 1937, 18: 971.

The main object of this article is to show that the neoplasm of the choroid which has hitherto been described in the literature as choroidal sarcoma is much more probably a neurogenetic tumor, arising from the Schwann-sheath cells of the posterior ciliary nerves traversing the choroid. The neural origin of so-called sarcoma of the choroid is supported by the histological observations in 7 cases which the author has studied.

Before presenting and discussing his histological studies, the author briefly summarizes the literature dealing with neurogenetic tumors in general, and describes the structure of choroidal, neural, and other neoplasms, including those termed sarcoma, that are found in this vascular membrane.

The nature of neurogenetic neoplasms in general is discussed, with particular reference to Masson's histological investigations regarding cutaneous nevi and tumors of the peripheral nerves. The literature regarding melanotic neoplasms and the origin of pigment is reviewed.

The author suggests a revised classification of neoplasms which would distinguish ectodermal neural tumors from those of a different embryonal origin.

LESLIE L. MCCOY, M.D.

Gradle, H. S.: X-ray Therapy of Retinal-Vein Thrombosis. *Am. J. Ophth.*, 1937, 20: 1125.

The mechanism of the production of retinal-vein thrombosis appears to be as follows:

1. Under the influence of some general condition, there is produced a narrowing of the lumen of the retinal arteries that results in a marked decrease in the rapidity of the blood stream.

2. As the result of a generalized toxemia or sclerosis, an endophlebitis or mesophlebitis appears in a vein. This inflammation produces a roughened nodule, probably made up primarily of endothelial cells, which protrudes into the lumen of the vein.

3. From the blood stream, which has been slowed up primarily in the arteries and secondarily in many cases by the sharp retrobulbar bend of the vein, fibrin together with red and white blood cells is caught by the nodule within the lumen of the vein. From these deposits, the nodule increases in size in three dimensions until the lumen of the vein is nearly or entirely closed.

4. After the circulation of the blood in the vein has decreased nearly to the vanishing point, the ophthalmoscopically visible manifestations appear in the retina.

After the vein has been more or less completely occluded, the retinal phenomena appear in probably the following order: retinal edema, loss of vision, retinal hemorrhages, exudative areas.

The retinal hemorrhages vary in extent according to the caliber of the thrombosed vein and the extent of the retinal area drained by the vein. In all probability, the hemorrhages are from the capillaries and not from a rupture of the vein itself.

It is certain that in some cases, probably the late ones, there has been a growth of heavily vascularized new tissue over the surface of the iris which, in turn, leads to a complete blockage of the chamber angle. These are undoubtedly the cases of severe "hemorrhagic glaucoma." In other cases, the angle occlusion results only from an albuminous coagulum.

In view of the known danger of eventual malignant hypertension, it has been the policy of many ophthalmologists to insist upon the daily and continued use of pilocarpine in the affected eye for at least several years or until the danger seems lessened. The continued use of a miotic as a preventive is a wise precaution.

"From these few statistics, it would not appear that irradiation is entirely successful in preventing secondary glaucoma subsequent to retinal-vein thrombosis. But I have a very definite impression that this therapy is of value in that respect and I intend to continue its use, probably somewhat more intensively in the future. But from the standpoint of rapidity of absorption of retinal hemorrhages, no difference could be noted between the eyes that were irradiated and those that were not. From the standpoint of final vision it is evident that x-ray therapy is of no material benefit. But from the study of this and similar series of cases, it can be seen that a fairly high percentage of cases of hypertension secondary to retinal-vein thrombosis occurs in preglaucomatous eyes in which hypertension would eventually develop even without the ocular insult. The latter precipitates an acute attack. The prevention of hypertension in the eyes that are not of preglaucomatous type can be aided either by the continued local use of a miotic or by radiation therapy in a high percentage of cases." LESLIE L. MCCOY, M.D.

Stallard, H. B.: A Case of Intra-Ocular Neuroma (von Recklinghausen's Disease) of the Left Optic Nerve Head. *Brit. J. Ophth.*, 1938, 22: 11.

Von Recklinghausen's disease is congenital, slowly progressive, and affects males more commonly than females. Ocular complications are evident in some cases of this disease. The characteristic pathological changes are confined to, and diffused throughout, the distribution of one or more contiguous nerves, or a nerve plexus. Branches of the first division of the fifth cranial nerve, the optic nerve, and nerves to extra-ocular muscles are sometimes affected.

A case of neuroma affecting the optic nerve head of the left eye in a young man nineteen years of age, is reported. His history showed that in two preceding generations of the family there had been cases of multiple neurofibromas affecting the central nervous system and the nerves serving the special senses of sight and hearing. The histopathology of the neoplasm affecting the optic nerve head is described, and microphotographs illustrating these changes are shown. Three years after the disease had been discovered in his left eye, the patient developed signs of raised intracranial pressure from a neoplasm, or possibly several neoplasms, inside the skull. The right auditory nerve was involved. A subtentorial decompression was followed by death two days later. LESLIE L. MCCOY, M.D.

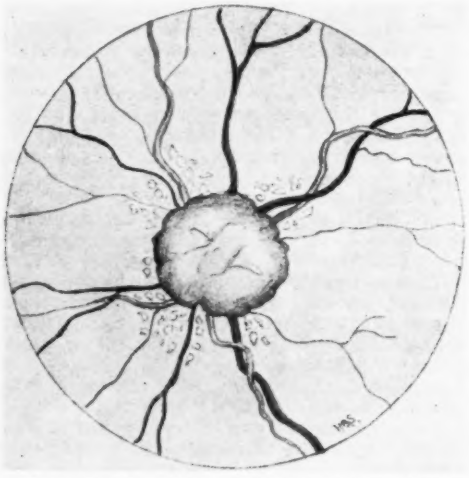

Fig. 1. Drawing of left optic disc and adjacent fundus.

Goldstein, I., and Wexler, D.: Bilateral Atrophy of the Optic Nerve in Periarteritis Nodosa: A Microscopic Study. *Arch. Ophth.*, 1937, 18: 767.

The authors have given a detailed historical account of bilateral atrophy of the optic nerve in periarteritis nodosa, an unusual condition, and have illustrated their article with photomicrographs and a very detailed case report. Then they summarize as follows:

"The lesions in this case correspond to those described in a great majority of the cases of this condition reported. Apparently the arteries of the ciliary system are most vulnerable. In almost every instance the choroidal vessels are affected and in some the short posterior ciliary arteries as well. In cases in which the retinal artery has been found to be diseased such change is limited in the portion behind the lamina cribrosa and not in the retinal arterioles. That the changes are restricted to these vessels conforms with the general rule that periarteritis nodosa attacks only vessels of medium size or those with well defined muscular coats. Von Herrenschwand expressed an interesting opinion regarding the site of predilection of the lesion. It appeared in his case that the periarterial nodes occurred particularly where the artery altered its direction, such as at its entrance into the sclera, its course through the lamina cribrosa, and in its course from the sclera toward the ciliary body.

"In the present case the posterior ciliary arteries were severely diseased, while those of the choroid were moderately so. It is fair to assume that the destruction of the layer of rods and cones and the extensive subretinal exudation are to be traced to disease in the choroid. As regards the appearance of the fundus, the widespread pigmentary disturbance may be traced to the disturbance in the neuro-epithelial layer and perhaps also to the subretinal exudate. In explanation of infiltration of the disk and the lamina cribrosa, there was sufficient indication that there had been neuritis which was dependent on disease of the ciliary arteries supplying this region (the circle of Zinn). Although the widespread disturbance of neuro-epithelium was undoubtedly a factor, it is extremely doubtful that even this could have produced such rapid loss of vision. There are, nevertheless, two distinct anatomic grounds for the

loss of vision. It would appear, however, that the more rapid and greater loss is to be attributed to the local change in the nerve and that the retinal lesion was contributory. What would have ensued had the patient survived is problematic; perhaps detachment, as in Böck's last case, would have resulted, due to separation of the epithelial layer."

LESLIE L. MCCOY, M.D.

NOSE AND SINUSES

Meland, O. N.: The Treatment of Epitheliomas of the Nasolabial Fold. *Am. J. Roentgenol.*, 1937, 38: 730.

Meland states that epitheliomas of the nasolabial fold grow slowly, but if they are once disturbed by abortive or inadequate treatment they are progressive and destructive. They extend along the lines of embryological development.

Protracted, fractionated radium therapy given at a distance is the method of choice, but the treatment must be given over a fairly large area. Protracted roentgen therapy will give similar results.

In recurrent carcinomas, the possibility of success is dependent upon the presence or absence of necrosis of cartilage and bone which is secondarily infected.

When adequate irradiation is not followed by healing, electrocoagulation followed by plastic reconstruction at a later date is advisable.

JAMES C. BRASWELL, M.D.

MOUTH

Patterson, N.: Carcinoma of the Cheek. *Brit. J. Surg.*, 1937, 25: 330.

Before 1926 the author had excised carcinomas of the cheek from the inside of the mouth, but was dissatisfied with the approach. Because of the possibility of sloughing of the overlying skin following the use of the diathermy electrode, and a tendency of the condition to recur anteriorly, he was often reluctant to make a very deep excision.

He then devised an operation in which the skin of the cheek was reflected upward and medialward from the entire area from a line extending downward in front of the lobe of the ear and forward along the border of the jaw. The facial artery and vein were excised from this region, and, if necessary, part of the masseter, ramus, or alveolus of the jaw could be removed. A wide removal with diathermy of the tumor was done, and the cheek closed. It is important to keep the mouth "pried" open several times a day until fear of contraction is past. The parotid duct was cut in all cases, but the gland should give no subsequent trouble. The procedure may well be divided into two stages; the skin pocket should be packed until granulations have formed.

A series of 10 cases was reported; only one known recurrence was seen, and there was no operative mortality. Glands of the neck were involved quite late from this primary location, and only one regional gland dissection was reported. If the overlying skin was involved, it was excised, and a flap brought up from lower down on the neck for closure of the cheek; the defect on the neck was allowed to close itself.

JAMES BARRETT BROWN, M.D.

NECK

Frank, I., and Scheer, C.: Sheath of the Internal Carotid Artery: A Route for Infections from Primary Lesions. *Ann. Otol., Rhinol. & Laryngol.*, 1937, 46: 912.

The authors observed 2 cases of severe tonsillitis which led to meningitis, the pathway of the infection being through the carotid sheaths. From the literature they collected 87 cases in which endocranial complications followed buccopharyngeal infections. The pathways are postulated to be the venous channels, direct extensions of the phlegmon through the parapharyngeal space, eroded bone, and, finally, the lymphatics. All these structures have a close anatomical relationship to the carotid sheaths.

In the neck the carotid sheath forms part of the posterior parapharyngeal space. Here it is only incompletely separated from the tonsils and paratonsillar spaces. In extension upward, it is intimately connected with the dura mater in the carotid canal, subdurally with the cavernous sinus, and with the meninges in the central cerebral fissure.

The authors injected 24 dogs and 19 puppies. The injections were made into the sheath of the internal carotid artery. The material consisted of hemolytic streptococci, india ink, or tragacanth, alone or mixed with bacteria. A meningo-encephalitis was produced in 1 dog. Infiltration of the carotid sheath was produced in many dogs.

The carotid sheath thus seems to represent another important pathway of infection from the pharyngeal to the cranial structures. FRED S. MODERN, M.D.

Frankau, C., Pugh, G., Windeyer, B. W., Turner, P., and Others: The Management of Tuberculous Glands in the Neck. *Proc. Roy. Soc. Med.*, Lond., 1937, 31: 103.

Frankau states that tuberculous infection of the glands is bovine in 90 per cent of the cases. The pathways of the infection are via the nasopharynx, the intestinal tract, and the mediastinum. The treatment should be conservative if the involvement is early and not yet caseous, if the infection is massive and advanced, or if the involvement is diffuse but not caseous. The treatment should be operative in caseation and old abscesses. Irradiation may be of value in certain cases. Tuberculin is valueless.

Radium treatment seems to be of definite value, according to Pugh. From 24 to 30 applications are necessary. The results seem to be lasting; of over 300 patients so treated, only 2 were readmitted. It is a distinct advantage for the irradiation therapy to be as long as possible, as this permits adequate constitutional treatment.

At Middlesex Hospital, Windeyer reports that cases have been treated by: (1) surgery with radio-

therapy, (2) roentgen irradiation, and (3) radium irradiation. Irradiation seems to be definitely beneficial, but only as an adjunct to proper general constitutional treatment. Septic foci must be removed, and broken-down glands aspirated before irradiation is attempted.

P. Turner does not aspirate, but curettes broken-down glands and shrinks tonsils by ethyl iodoricinoleate. He believes that fistulas should be curetted as thoroughly as possible.

Nicholls thinks that the disease is milder than formerly, and that constitutional treatment is about as effective as surgery or irradiation.

The procedure varies with the virulence of the infection, according to Donald. In some cases small incisions with expression of the material are still satisfactory.

If the portal of infection is in the nasopharynx, G. Turner states that the whole cervical chain, on both sides, if necessary, should be cleaned out. If the portal is in the trunk, the general measures are more important than surgery.

FRED S. MODERN, M.D.

Sonck, C. F.: Tumors of the Carotid Gland. A Case Operated Upon in Finland (Ueber Carotisdruesengeschwuelste. Zue einem in Finnland operierten Fall). *Finska läk.-sällsk. handl.*, 1937, 5: 417.

Attention is directed to 236 cases of tumor of the carotid gland reported in the literature. The author does not consider that a number of these cases were definitely proved to be tumor of the carotid gland. He reports in great detail an operation for tumor of the carotid gland done in Abo in the year 1933. The histological examination showed that the tumor was apparently composed of a true neoplastic, but benign tissue. It had a pronounced alveolar structure, and was surrounded by a connective-tissue capsule. The specific epithelial-like tumor cells lay in a network of delicate fibrillæ and adventitial cells; the tumor tissue was everywhere rich in blood vessels. The morphology of the epithelial-like cells is discussed in detail. In conclusion, attention is called to the fact that the tumors of the carotid gland usually occur unilaterally. These tumors are encountered most generally in patients between twenty and fifty years of age. Women seem to be affected somewhat more often than men. The tumors generally grow very slowly; periods of observation lasting for thirty-seven years are known. Frequently the extirpation is done only for cosmetic reasons, in which case the operation not infrequently has a fatal result. This is true because the tumors are deep-seated and the operation is complicated. In about half of 180 cases described, ligations and resections of the carotid artery were necessary. About 30 per cent of these operations ended fatally because of embolism or thrombosis. The general operative mortality is figured at 17 or 18 per cent.

For the extirpation the author recommends the procedure of Peterson: preparatory systematic compression treatment of the common carotid artery, and exploratory operation when the tumor cannot be removed without ligation of the common or internal carotid arteries.

The subjective symptoms from the tumor are often remarkably slight. Really severe pains set in only with malignant degeneration and rapid growth. The characteristic feature is a slight degree or absence of vertical mobility of the tumors; but there is a very distinct horizontal mobility. Previous to operation the diagnosis is correctly made only in the rarest of cases. The differential diagnostic points are described. (HAAGEN). LOUIS NEUWELT, M.D.

Mahorner, H. R.: The Experimental Production of Goiter. *Arch. Surg.*, 1937, 35: 937.

The author discusses the literature of the pathogenesis of thyroid hyperplasia, mentioning the rôles of infection, diet, and ligation of the adrenal vessels, and the effect of the secretion of the anterior lobe of the pituitary gland. He gives references to the literature and mentions disparities in results. He made re-investigations and reports as follows:

In all the dogs used, control biopsies of the thyroid and gross measurements were made. There were no attempts to produce iodine deficiency. In 14 dogs foci of infection were set up in the sternocleidomastoid muscles, and the experiments were concluded at intervals of from four to sixty-four days. In all but 1 the infection was active at the termination of the experiment. In none was there any gross or microscopic evidence of alteration of the structure of the thyroid gland.

The author states, "The results in these experiments support the conclusion that a focus of infection in the dog does not produce changes in the thyroid gland suggestive of hyperplasia, at least within a period of thirty-two days."

Because an increased basal metabolic rate had been shown by previous investigators to follow partial excision of or injury to the adrenal gland, the author attempted to produce thyroid hyperplasia by damaging the adrenals. The methods used were crushing from one-half to two-thirds of the adrenals in 12 dogs and freezing both adrenals solidly with an ethylchloride spray in 7 dogs. In both series, at intervals of from four to one hundred and twenty-seven days, autopsy revealed neither gross nor microscopic evidence of hyperplasia nor retrogression of the thyroid gland.

The effect of a high calcium intake was determined in 6 dogs who were given calcium chloride in fairly large amounts in drinking water. The blood calcium was elevated from 0.5 mgm. to 2 mgm. as a result of this regimen. Three dogs died on or prior to the twelfth day; in them no definite changes were determined.

In the 3 animals surviving for eighty, ninty-six, and one hundred and thirteen days, definite hyperplasia of the thyroid was found. The author concludes, "These experiments indicate that calcium eliminates the colloid from the thyroid gland and in-

creases the size of the epithelium. Thus, from these experimental results, at least, it does not seem that calcium chloride is the cause of colloid goiter but that it does change the histologic appearance of the thyroid gland."

In 5 dogs, 1 c.cm. of gonadotropic principle from the urine of pregnant women was injected. No gross or microscopic evidence of hyperplasia or other change in the thyroid gland was found.

Eight guinea pigs were given 1 c.cm. of extract from the anterior lobe of the pituitary gland daily. Four of the animals sacrificed on or prior to the eighth day revealed questionable hyperactivity; three sacrificed on the tenth, nineteenth, and thirty-second days revealed definite hyperactivity of the thyroid, as evidenced by reduction in size of the vesicles, diminution of the colloid, vacuolation and the increased height of the lining epithelium. One animal received daily injections for sixty-four days. Changes were not found. FRED S. MODERN, M.D.

Le Fort, R.: A Human Thyroid Graft in a Case of Infantile Myxedema (Greffe de thyroïde humaine dans un cas de myxœdème infantile). *Presse méd.*, Par., 1937, 45: 1771.

Le Fort reports a case of infantile myxedema in which a portion of the thyroid gland from a condemned criminal was grafted in the abdominal wall. This operation was done in 1925, when the child, a girl, was two years old; she presented the typical appearance of myxedematous idiocy; she had never spoken a word and showed no signs of intelligence. The thyroid graft was taken from the man immediately after his execution; about half of the right lobe of the thyroid was taken, placed in warm saline solution and rushed to the hospital, where the child was prepared for operation. The glandular tissue of the graft was exposed on one side; the graft was placed in the rectus muscle of the left side.

There was an immediate postoperative reaction with a rise in temperature to 38.3° C., an increase in the pulse rate, and loss of weight. As these symptoms subsided, the child showed definite improvement in both physical and mental development; she spoke a few words in less than two weeks after the operation. She has been under constant observation for twelve years, and now at fourteen is continuing to grow and to develop, although she is definitely backward, being physically and mentally at the level of nine years of age. This case has not been reported previously. ALICE M. MEYERS.

Canuyt and Gunsett: The Method of Radiography, Tomography, or Planigraphy Applied to Cancer of the Larynx (La méthode des coupes radiographiques, tomographie ou planigraphie appliquée au cancer du larynx). *Presse méd.*, Par., 1937, 45: 1559.

Canuyt and Gunsett note that roentgenograms of the larynx taken by the usual method are not satisfactory. They have employed the method of tomography, or planigraphy, in which the roentgenograms are taken in different planes. The roentgenograms are taken from the front, plane by plane, showing the larynx, or any part of it, in projection. With this method, the laryngologist can study any particular area desired, or he can compare the structures of one side with those of the other.

The authors cite 5 cases of cancer of the larynx in which this method proved of definite value in diagnosis. In 2 of these cases the cancer (epithelioma) was unilateral, involving the pharynx also in 1 instance; and in 3 cases the growth was bilateral. In 1 case treated by deep radiotherapy, repeated examinations by this method showed considerable diminution in the size of the tumor. This method may prove of value not only for diagnosis, but also in the control of treatment. ALICE M. MEYERS.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Asch, C.: Experiences with Subcutaneous Drainage of the Cisterna Magna (Erfahrungen mit der subkutanen Drainage der Cisterna cerebello-medullaris). *J. internat. de chir.*, 1938, 3: 1.

The author summarizes the various theories about the secretion and absorption of the cerebrospinal fluid and of the measures that have been tried to date for treatment of chronic intracranial hypertension. She draws particular attention to the method of subcutaneous drainage of the cisterna magna first proposed by Westenhoeffer in 1905 and successfully carried out independently of him by Anton and Schmieden since 1917.

Thirty-four cases are cited in which this method has been used in the treatment of chronic disease, of which 13 are from Schmieden's series. She then lists 17 cases reported by de Quervain, namely 14 cerebral tumors, 1 cysticercus, and 2 cases of simple chronic hydrocephalus. De Quervain attempts to make this drainage more effective by fixing one or two bundles of silkworm gut against the hole in the atlanto-occipital membrane, and leading them out into a subcutaneous pocket in the neck.

Five patients with cerebral neoplasm died during their stay in the hospital, some after several months; 1 died from pulmonary embolus and 2 following attempts at radical operation. Nine left the hospital with cerebrospinal fluid in a subcutaneous sac in the region of the back of the neck, and in 1 this was present seven years later. In 8 additional patients it was not possible to decide with certainty whether this sac had been formed.

Taking the whole series, one of the chief causes of death was compression of the cerebellum in the foramen magnum.

The best results were seen in 2 patients with chronic hydrocephalus. One was able to take up employment again to a certain extent and enjoyed excellent health after eight years; the other lost all papilledema and his visual acuity returned almost to normal, and after a period of three and one-half years the suspicion of neoplasm was practically abandoned.

The symptoms of several patients were much relieved by repeated puncture of the artificial sac.

The author believes, with Schmieden, that this operation is to be recommended in supratentorial tumors. She agrees with Schloffer that when the tumor is below the tentorium the procedure should be avoided as the possibility of future lumbar puncture is to be borne in mind. This method of drainage of the cisterna magna finds its chief use in the cases of patients with chronic hydrocephalus, where it has the advantages of simplicity and comparative harmlessness.

Pattison, A. R. D.: Supracallosal Epidermoid Cholesteatomas. *Lancet*, 1937, 233: 1303.

The author describes 2 cases of epidermoid cholesteatoma which are of unusual interest because the tumors were situated in the supracallosal region. Although 142 cases of epidermoid cholesteatoma have been reported in the literature for 1936, none were described as having arisen in this region of the brain.

The tumors are congenital and their favorite site of origin is along the primary flexures of the embryonic brain. In those cholesteatomas arising above the corpus callosum, the epithelial implantation probably occurred along the longitudinal cerebral fissure. Cholesteatomas occur in various places in the diploë of the cranial bones, and they are known to occur in the temporal bone. The lesion in the latter location is thought to be due to the degenerative changes that follow chronic epithelial desquamation, though not all of such lesions can be explained on this basis. The highly complicated development of the temporal bone makes it an ideal place for ectodermal inclusions.

The first of the author's two patients was admitted to the hospital as an emergency case shortly after a convulsive seizure, and died three days after his admission. An autopsy was performed, which is fully reported in the original article.

The second case was that of a young woman with headache, vomiting, and attacks of unconsciousness. A ventriculography was done and the patient was successfully operated upon, with removal of practically all of the tumor. The case is also carefully described and discussed in the original article.

It is interesting to note that the slow progression and intermittent character of the complaint led to a diagnosis of multiple sclerosis in each case. In both cases the symptoms were strikingly similar: slow progression, low grade papilledema, and convulsions; and in accord with reports on the intracranial cholesteatomas by other authors.

In discussing the nomenclature, the author states that he is of the opinion that the qualifying term, "epidermoid" or "dermoid," would seem to be adequate in describing intracranial cholesteatomas, and that the term "cholesteatoma" is used merely in deference to tradition and usage.

ADRIEN VERBRUGGHEN, M.D.

Wakeley, C. P. G.: The Surgery of the Pineal Organ. *Brit. J. Surg.*, 1938, 25: 561.

The author discusses the various phases of the development, function, and anatomical arrangement of the pineal organ. He calls attention to the calcification of the pineal gland, which can be shown in roentgenograms in about 70 per cent of adult skulls, while calcification in the choroid plexus is found in about 5 per cent of adults. The symptoms of pineal tumors are due not only to the size of the lesion, but

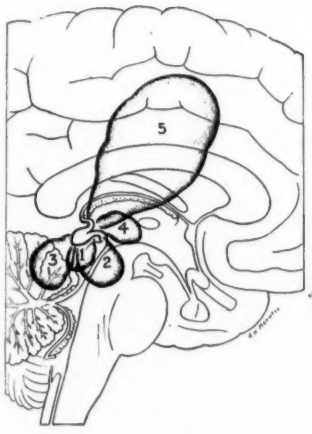

Fig. 1.

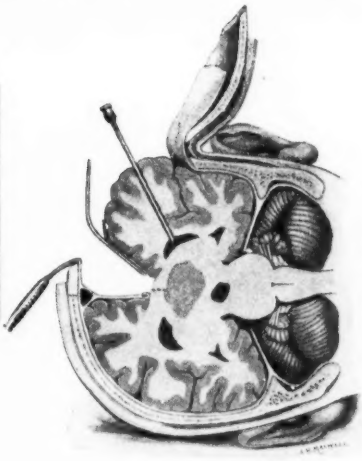

Fig. 2.

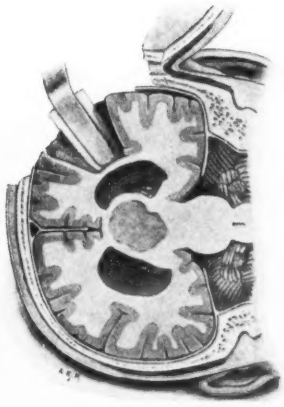

Fig. 3.

Fig. 1. Schematic representation of the various ways in which a pineal tumor may extend and cause pressure symptoms: (1) on the corpora quadrigemina; (2) on the aqueduct of Sylvius; (3) downward on the cerebellum, causing cerebellar symptoms; (4) on the midbrain; and (5) on the cerebral hemisphere. Fig. 2. The posterior part of the cerebral hemisphere is retracted so as to expose the corpus callosum. Fig. 3. Sectional view of the approach to a pineal tumor through a dilated lateral ventricle.

also to the direction in which it grows, as shown in Figure 1. The author divides the symptoms first into the focal signs, which are produced as a result of the anatomical position of the pineal tumor. The superior corpora quadrigemina may be involved, and eye signs such as loss of pupillary reaction, reaction to accommodation upward, downward, and lateral movement, in the order named, may occur. It is extremely common to find that the light reflex is absent and the patient is unable to look upward. The aqueduct of Sylvius may be occluded and produce a severe degree of internal hydrocephalus with the associated symptoms due to increased intracranial pressure. One of the factors to be considered in the production of internal hydrocephalus is the likelihood of the compression of the vein of Galen with resultant engorgement of the choroid plexus, which may produce an increased secretion of spinal fluid. Patients may show cerebellar symptoms as a result of extension of the tumor into the cerebellum. As the tumor grows, extension may occur upward into the hemispheres, with involvement of the optic radiations and the resultant right or left homonymous hemianopia.

Constitutional manifestations of pineal tumors are almost confined to the male sex. Occasionally there is a disturbance of growth associated with pineal tumors, which affects chiefly the genital organs. This disturbance is often associated with adiposity and sometimes with general and symmetrical overgrowth.

The author discusses the common pathological conditions arising in the region of the pineal body, such as cysts, cholesteatomas, teratomas, pinealomas and pineoblastomas.

The methods of approach and removal of pineal tumors are presented. The author prefers rectal avertin anesthesia, and local infiltration of the scalp with ½ per cent novocaine, followed by the intratracheal administration of gas and oxygen. The intratracheal gas-oxygen anesthesia makes certain that the patient is completely quiet during the deep approach to the pineal gland and, at the same time, permits the use of oxygen or carbon dioxide if the patient should stop breathing. The methods of Dandy and Van Wagenen are described. The approach of Dandy is shown in Figure 2, while the method of Van Wagenen is illustrated in Figure 3. Eight cases of pineal tumors are reported in detail.

ROBERT ZOLLINGER, M.D.

SYMPATHETIC NERVES

Wertheimer, P., and Bérard, M.: Surgery of the Cervicothoracic Sympathetic Chain (La chirurgie de la chaîne sympathique cervico-thoracique). *J. de chir.*, 1938, 51: 31.

Among the operations on the sympathetic nervous system, excision of the stellate ganglion is done most frequently because of many varying indications; but the results of this operation are not constant. One of the authors (Bérard) previously pointed out that the results of sympathectomy in angina pectoris are improved by extension of the resection toward the thoracic chain. These conclusions are based not only on the authors' personal experience but also on the

Fig. 1.

Fig. 2.

Figs. 1 and 2. The thoracic sympathetic chain.

results obtained by Leriche, Fontaine, White, and others. Wertheimer and Bérard have recently employed the technique of Gask and Ross with resection not only of the lower cervical, but also of the upper thoracic chain, in the treatment of angina pectoris, paroxysmal tachycardia, and vasomotor disturbances which are found in the upper extremities.

It is true that the more important afferent sympathetic nerve fibers supplying the upper extremities and the heart pass through the stellate ganglion. However, certain nerve branches coming from the second thoracic ganglion enter the lower root of the brachial plexus directly; and, also, cardiac and pulmonary nerve fibers originate in the second, third, and fourth thoracic ganglia, and their anatomical and physiological independence has been definitely demonstrated by various investigators. It would seem, therefore, that the fibers originating in the second thoracic ganglion must be sectioned to ensure sympathetic denervation of the upper extremity, and that in angina pectoris the resection should be carried even further along the thoracic chain. There is a definite advantage in preserving the stellate ganglion, especially as degeneration of the postganglionic fibers is avoided if the peripheral sympathetic fibers can be disconnected from the cerebrospinal centers without removal of this ganglion.

With the technique of Gask and Ross as used by the authors, a subclavicular incision about 1 cm. below the clavicle is employed. The stellate ganglion is exposed from below upward and the upper thoracic chain is easily identified, lying above the vertebral bodies, slightly to the side. The second thoracic ganglion and sometimes the third ganglion is exposed. A segment of the sympathetic chain is resected below the stellate ganglion. The stellate ganglion may also be resected according to the technique of Leriche. Local anesthesia is employed for the operation, and the injections are best made plane by plane as the operation proceeds, and thus the danger of puncturing a small blood vessel is avoided.

In one of the cases operated upon by the authors a small pneumothorax developed after operation, but the air was absorbed within a few days. Another postoperative complication that may occur is temporary paralysis of the diaphragm due probably to injury to a prolongation of the phrenic nerve in the course of operation. This paralysis is usually of short duration, but if a bilateral sympathectomy is to be done, the second stage of the operation should be delayed until it has entirely disappeared.

Five illustrative cases are reported, one of paroxysmal tachycardia, and 4 of vasomotor disturbances in the upper extremities, in which operation by the technique of Gask and Ross gave good results.

ALICE M. MEYERS.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Portmann, U. V.: Classification of Mammary Carcinomas to Indicate Preferable Therapeutic Procedures. *Radiology*, 1937, 29: 391.

A classification for cases of mammary carcinomas is desirable and should be adopted. It should be based upon the clinical and pathological evidences of the extent of the disease, and it should indicate the method of treatment to be preferred in each individual case. A completely satisfactory classification has not been previously developed. Such a classification is suggested by this author. He divides the cases into three groups, each of which is shown to represent the prognosis and indications for therapeutic procedures. The classification is as follows:

Group I: (a) Tumor definitely localized in the breast and movable; (b) skin not involved; (c) metastases not present in the axillary lymph nodes.

Group II: (a) Tumor localized in the breast and movable; (b) skin not affected, and it should indicate only very slightly edematous or ulcerated; (c) metastases present in the axillary lymph nodes, but only a few involved.

Group III: (a) Tumor diffusely involving the breast; (b) skin involved (edema or ulceration), and multiple nodules present; (c) metastases to numerous axillary lymph nodes or to other tissues, such as supraclavicular nodes, lungs, and bones.

The patients in Group I should be operated upon radically but should not be irradiated. Almost 100 per cent of these patients will survive for five years. This group comprises about 30 per cent of all cases of mammary carcinoma.

The patients in Group II should have radical operative removal of the breast and axillary contents, and in addition they should be given irradiation postoperatively. About 50 per cent of such patients will survive five years if radical operation is the only treatment, and at least 75 per cent will survive that long if irradiation is added to the operation. This group comprises about 25 per cent of all cases.

The patients in Group III with clinical manifestations of incurability should not be subjected to radical surgical procedures. These patients should be treated by irradiation alone to prolong their lives. This group comprises about 45 per cent of all cases.

The clinical manifestations of incurable breast cancer are:

1. Manifestations affecting the skin: (a) edema (pig-skin or orange-peel dimpling) even of moderate degree; (b) brownish-red induration and inflammation; (c) multiple nodules; (d) ulceration.

2. Manifestations affecting the breast: (a) edema; (b) diffuse infiltration; (c) multiple secondary tumors; (d) fixation of the breast or of the tumor to the chest wall.

3. Manifestations of metastases: (a) axillary lymph nodes, numerous or fixed; (b) supraclavicular metastases, or edema of the arm; (c) distant metastases, such as those in the lungs, bones, or other organs.

A thorough search should be made for the clinical manifestations of incurability which are enumerated above, and patients with any of them should not be subjected to radical operation, but should be given irradiation alone. J. DANIEL WILLEMS, M.D.

Pfahler, G. E.: The Treatment of Carcinoma of the Breast. *Am. J. Roentgenol.*, 1938, 39: 1.

According to United States Vital Statistics, there were 6,665 deaths from cancer of the breast in 1920 and 10,204 deaths in 1929, and it has been stated that there were 13,000 in 1933. Since the average length of life before death from carcinoma of the breast is from three and one-half to four years, and since probably 20 per cent of all cases are permanently cured, we have a right to assume that approximately 50,000 women in the United States have cancer of the breast at the present time.

Pfahler groups carcinoma of the breast into three stages. In the first stage there is a small isolated movable tumor in the breast with no palpable lymph nodes and with no roentgenological evidence of intrathoracic or skeletal metastases. In the second stage there are larger tumors in the breast which are fixed to the skin or pectoral muscles, with palpable axillary lymph nodes or microscopic evidence of axillary metastases. In the third stage the tumors in the breast are associated with axillary lymph nodes and supraclavicular or distant metastases. The treatment in the first stage is radical operation or radical operation with postoperative irradiation. The treatment in the second stage should consist of preoperative irradiation, followed promptly by radical operation and then postoperative irradiation. In the third stage the author uses irradiation only, or irradiation plus operation if the disease can be made operable. Following this, postoperative irradiation should be given. The prognosis is variable; after operation in the first stage 70 per cent of the patients may be alive and well at the end of five years. If the postoperative irradiation is added to operation, 71 per cent may be alive and well after five years. Of the patients in the second stage 28 per cent may survive for five years when operation alone is done, whereas if pre-operative irradiation is given followed by operation and postoperative irradiation, 57 per cent may be alive and well in five years. Of the patients treated in the third stage probably not more than 5 per cent are alive and well at the end of five years. Irradiation may accomplish prolongation of life and relief of pain.

Pfahler discusses the theoretical and biological evidence favoring pre-operative irradiation. He

states that this irradiation tends to devitalize or destroy the more malignant types of cells (Grades 3 and 4, Broders), and renders the normal tissues less receptive to implantation.

Localized postoperative treatment is intended (1) to destroy any malignant cells that may have been transplanted; (2) to destroy any microscopic remnant of cancerous tissue which the surgeon may have missed, and (3) to render the normal tissue more resistant to cancerous growth. It is the accepted procedure in most of the large clinics both in this country and abroad.

To obtain the most benefit from postoperative treatment the patients should be treated as soon after the operation as possible, which is usually within from ten days to two weeks, even though the wound is not entirely healed. This is especially important if no pre-operative irradiation has been given. Pfahler has not found that postoperative irradiation interferes with the healing of the wound, nor has he found that the wound breaks down because of postoperative irradiation, provided one does not exceed the "saturation dose."

It is well known that cancer of the breast is more malignant in young women. Pregnancy should be avoided when cancer of the breast is present. Experimental evidence indicates that the ovarian hormones stimulate the production of cancer of the breast in animals which have any susceptibility. In recurrent or metastatic extension from cancer of the breast, oophorectomy or ovarian sterilization by irradiation has been followed in a considerable number of cases by the disappearance of the lesions. Therefore, Pfahler recommends ovarian sterilization in all women with carcinoma of the breast who are still menstruating.

In his pre-operative treatment the author gives approximately 900 roentgens through each side of the breast and through the axillary and supraclavicular region in the course of two weeks, using 200 kv. 50 cm. distance, and a 0.5 mm. copper screen. In the two treatments over the breast the patient is irradiated tangentially according to the method of Holfelder. This amount of irradiation is intended to be supplemented by postoperative irradiation.

The postoperative treatment is begun through a portal occupying the supraclavicular and coracoid region. For a second portal the author uses the posterior axilla, with the patient's arm thrown over the opposite shoulder and the rays directed into the axilla, into the deeper part of the supraclavicular region and toward the upper mediastinum. As a third field a large area is treated, extending from the lower border of the supraclavicular portal to the level of the epigastrium and from the right border of the sternum to the left anterior axillary fold. Over the latter field the so-called low voltage technique is used, with 135 kv. 2 mm. aluminum screen and 50 cm. distance, 200 or 300 roentgens being given at each application. The aim is to deliver into this area a total of from 1,800 to 2,400 roentgens, counting both pre-operative and postoperative treatment. This treatment is given according to the "saturation technique." The aim is to deliver the same total roentgen dosage into the axilla, and the coracoid and supraclavicular regions. In the latter regions 200-kv. technique is used.

In stage three, especially, every case must be individualized. These more advanced cancers of the breast are treated best by the "saturation method" continued over a period of from four to six weeks or longer. At no time should the normal tissue tolerance be exceeded. By the cross-fire method, irradiation should be given as uniformly as possible throughout the tumor tissue including the regional lymphatics; the tangential method as advised by Holfelder should be used. In this group of cases, 200 kv., 0.5 mm., copper screen and 50 cm. distance will be most practical.

Recurrent carcinoma of the breast is nearly always a difficult irradiation problem. If the disease is localized, one can use intensive local treatment, preferably with radium, but quite successfully with roentgen rays. If the recurrence is widespread, or there is extension into the subcutaneous and cutaneous tissues one may control the disease for a time, even a year or two, but ultimate failure is the rule. The author has seen cases with metastatic carcinoma of the lung disappear and the patient live four years, and he has seen metastatic carcinoma of the bone heal and the patient live five years.

HAROLD C. OCHSNER, M.D.

Wangensteen, O. H.: Complete Costectomy. *Surgery*, 1937, 2: 852.

This article describes in detail a new and simple method of rib excision applicable in thoracoplasty and chronic empyema.

Thoracoplasties for tuberculosis or extensive chronic empyema are formidable operative procedures, and the patient is often in poor physical condition. The operation consists of a series of operations performed through long incisions. The trend has been toward more extensive removal of the first to the eighth ribs. Extensive incisions were necessary and they resulted in considerable loss of blood and shock.

The author has devised a method whereby the removal of ribs through short anterior and posterior incisions is accomplished to his own satisfaction. First, the rib is divided anteriorly either at the sternum or at the chondrocostal junction and the intercostal muscle bundles are separated along the lower margin of the rib by means of a stripper. At a second posterior operation, the rib is divided at the site of articulation with the transverse process, and the intercostal muscle bundles are separated from the superior border of the rib. The rib is then pulled out through the tunnel of the posterior incision. In the performance of both the anterior and the posterior operation the surgeon stands on the contralateral side.

Every surgeon who strips a rib from its periosteal bed takes advantage of the direction of insertion of

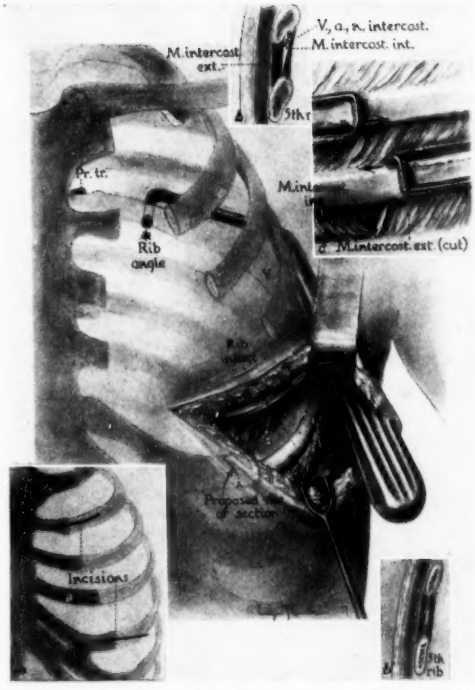

Fig. 1. The first stage of complete costectomy—the anterior operation. The periosteal stripper is being pushed along the lower margin of the fifth rib. The stripper can be pushed as far as the angle of the rib posteriorly. The muscles of the lateral thoracic wall are elevated on a retractor in the interspace as the periosteotome is pushed along the lower edge of the rib. *a*, The anterior incisions. *b*, The nature of attachment of the external and internal intercostal muscle fibers to the ribs in the vicinity of the angle of the rib; on the upper rib, shown in this insert, it is apparent that the periosteal stripper pushed posteriorly along the lower margin of the rib will detach only the fibers of the external intercostal muscles. On the lower rib, however, it is evident that the stripper will detach both internal and external intercostal muscle bundles. b^1, The nature of attachment of external and internal intercostal muscle fibers to the rib ventral to the axillary line. It is apparent that the periosteal stripper will separate both muscles from the rib when pushed along the borders of the rib. *c*, The direction of insertion of the external intercostal muscle bundles accounts for the simplicity of this method of rib removal. The internal intercostal muscle fibers, it is to be observed, run in the reverse direction.

the external intercostal muscle bundles upon the ribs. On the upper side he begins behind and strips in a forward direction; on the lower margin the rib is freed by stripping in the opposite direction.

Two remarkably lucid drawings accompany the article, which illustrate well the technical details of both operations. J. DANIEL WILLEMS, M.D.

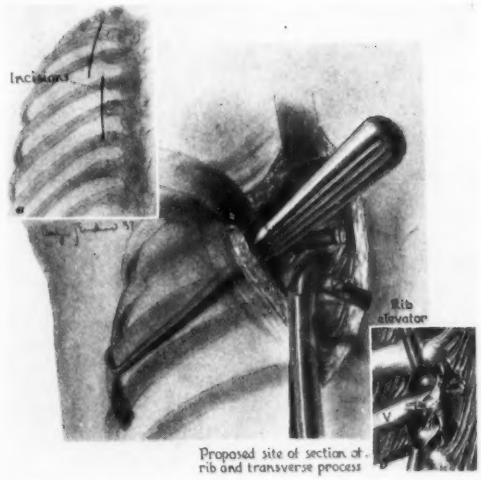

Fig. 2. The posterior operation in which the ribs are removed. The stripper is being pushed in a forward direction along the superior border of the rib. After exposure of the rib through the incision as shown in Fig. 2*a*, the costotransverse articulation is exposed (Fig. 2*b*) by cutting and separating the short and long levator muscles of the rib as well as the multifidus and intertransverse muscles and the intertransverse and costotransverse ligaments. After all the ribs to be removed have been sectioned, the rib is rotated into the wound and its separation from its periosteal bed proceeds as shown. Elevation of the muscles of the chest wall on a retractor in the intercostal space is a valuable expedient which facilitates this procedure.

TRACHEA, LUNGS, AND PLEURA

Goldman, A., and Adams, R.: Endobronchial Probing Combined with Serial Selective Bronchography Fluoroscopically Controlled. *Ann. Surg.*, 1937, 106: 976.

This article describes a method of endobronchial probing with selective bronchography under the control of the fluoroscope.

The apparatus used consists of a large, radiopaque Thompson bronchial catheter with curved tip, and of radiopaque ureteral catheters of different sizes. Palpable markers are placed on the latter at two points; the first one at a distance from the tip equal to the length of the bronchial catheter, and the second one 5 cm. further distant. The smaller catheter is inserted into the larger one, and the markers enable the operator to know in the dark the distance which the ureteral catheter protrudes beyond the bronchial catheter. A semi-rigid metal stillette or introducer, and a metal syringe for injecting oil through the ureteral catheter complete the equipment, with the addition of a combination fluoroscopic and roentgenographic tilt table.

The patient is prepared with a suitable dose of phenobarbital, and one and one-half hours later

cocaine hydrochloride is introduced for anesthesia. The proper bronchial catheter is fitted with the introducer and placed through the epiglottic ring under mirror vision. The catheter is then passed through the larynx into the trachea. The ureteral catheter is now inserted into the bronchial catheter and exploration carried out under fluoroscopic control. The ureteral catheter is pushed slowly beyond the bronchial catheter and can be introduced into any desired branch bronchus. Details of any isolated branch can be clearly shown by instillation of a drop or two of iodized oil. "Spot-films" may be made at any time. If necessary the small catheter may be withdrawn and larger amounts of iodized oil instilled through the bronchial catheter Permanent radiographic records can be made as desired, either as "spot-films" or as serial films.

J. DANIEL WILLEMS, M.D.

Ostrowski, T., and Eross, W.: Operative Treatment of Bronchiectasis by Means of One-Stage Lobectomy (Zur operativen Behandlung der Bronchiektasien mittels einzeitiger Lobektomie). *Arch. f. klin. Chir.*, 1937, 188: 509.

The author refers to both acquired and congenital bronchiectasis. The acquired types are caused by infectious diseases, measles, whooping cough, bronchopneumonias, but also as the result of eccentrically acting forces, and furthermore by atelectases. The authors saw such an instance following the obstruction of the right main bronchus by a collar button. The opinion, that these bronchiectases can also be caused by thromboses of the bronchial arteries is as yet not sufficiently corroborated. The researches of Sauerbruch and his school showed that 80 per cent of bronchiectases occurring during childhood are congenital, and these findings were supported by the pathologico-anatomical researches of Roessle.

Cough, which in children is not constant, is never absent in adults. Occasional traces of blood may be found in the sputum; fatal hemoptysis may occur. Usually there is no fever, but in the late stages there may be either irregular or continuous high fever. Bronchography with lipiodol or iodipin has brought us much further in the diagnosis of this condition, as physical examination does not reveal any specific findings. Stratigraphy and tomography have brought us still further.

Medical treatment has indeed led to improvements but not to cures. Pneumothorax, phrenicoexeresis, and thoracoplasty do not lead to the desired goal. Sauerbruch regards the extrapleural paraffin inlay as the method of choice in children. Lobectomy is today generally considered the method of choice. The authors then discuss the various techniques, especially the multiple-stage operations and the operations which do, and those which do not, require any preceding preparation.

Sauerbruch favors the multiple-stage procedure, in which he applies an elastic band around the hilum in order to leave a spontaneous line of demarcation upon the lobe. Brunn favors the one-stage removal of the lobe with closing of the wound and a permanent pull upon the superficial surface of the lung by means of suction drainage. Roberts and Nelson also discarded the preceding pneumothorax as they gradually opened the chest cavity and permitted the air to enter slowly.

Ostrowski presents detailed histories with 9 illustrations in 2 cases which he treated by operation. In these cases he carried out the treatment according to Roberts in that he employed his loop; he also used suction drainage according to the method of Brunn. He says that the dangers of one-stage lobe removal in cases in which there is a free tear in the pleura have been overestimated up until now. When the general condition is favorable this is the operation of choice.

With regard to complications, the one most to be feared is shock, following the constriction of the hilum, which makes itself evident in the decreased blood pressure, dyspnea, and attacks of coughing. Notwithstanding the general anesthesia, it is necessary to infiltrate the hilum with novocaine. Hemorrhages may occur from the hilus as well as from the cut strands of the pleura. By means of the suction drainage hemorrhages can undoubtedly be favorably influenced. Bronchial fistulas usually close up and heal spontaneously. Inflammatory conditions of the lung resulting from aspiration must be prevented by the patient being placed in the Quincke longitudinal position, or by bronchoscopic aspirations.

(FRANZ). HARRY A. SALZMANN, M.D.

Jacox, H. W., and Baker, M. R.: Primary Apical Lung Cancer Producing the Symptomatology of a Superior Pulmonary Sulcus Tumor: Report of a Case. *Radiology*, 1937, 29: 525.

Opinions regarding the origin of malignant tumors of the pulmonary apex and thoracic inlet vary widely. These tumors may arise from structures of the neck, such as sympathetic ganglia or persistent bronchial cleft tissue, or from the mucosa of the terminal bronchioles in the apex of the lung. The clear-cut symptomatology and clinical and roentgenographic findings they present seem to be related more to the location of the tumors than to any uniform histogenesis. A case which presented typical findings of a superior pulmonary sulcus tumor is reported in detail. At autopsy this tumor proved to be a squamous-cell carcinoma originating in the apex of the lung and invading the ribs, vertebræ, and soft tissues of the neck.

ADOLPH HARTUNG, M.D.

Mattick, W. L., and Burke, E. M.: Primary Bronchogenic Carcinoma from the Pathological and Radiological Points of View. *J. Am. M. Ass.*, 1937 109: 2121.

The author found 73 cases of carcinoma of the bronchus among 18,000 malignancies in their institution, a ratio of 1 to 250. In their post-mortem examinations, this lesion was noted to be half as frequent as carcinoma of the stomach, and it was

five times more frequent in males than in females. The greatest prevalence of the disease was between the ages of forty and seventy years, the highest incidence occurring in the fifth decade.

While universal pleomorphism was generally present, it was usually possible to group the tumors on a histopathological basis. Of the 62 cases studied histologically, there were 6 cases of adenocarcinoma, 40 of squamous-cell lesions, and 16 of anaplastic tumor. The hilus, or centrally located lesion, was from four to six times more frequent than the peripherally located lesion. Fifteen per cent of the authors' cases were atypical in that the symptoms were due to metastases and not to the primary lesion.

Diagnosis, even with the aid of roentgenograms, is often difficult, and any unilateral pulmonary lesion in a person who is past middle age should be viewed with suspicion until it is proven non-malignant. Lateral projections, bronchography with iodized oil, and pneumothorax are often of great diagnostic value.

The predominating roentgenographic characteristics in the authors' series, in the order of frequency, were as follows: atelectasis, 42 per cent; increased markings, 21.9 per cent; tumor mass, 13 per cent; pleural effusion, 15 per cent; and abscess or cavitation, 9 per cent.

The authors are not convinced of the efficacy of radiation therapy, yet they use continued protracted radiation, and, where indicated, endobronchial radon seed implants, or endothermic coagulation. They find few cases suitable for surgery, and few patients who are willing to submit to it.

EARL O. LATIMER, M.D.

Ormerod, F. C.: The Pathology and Treatment of Carcinoma of the Bronchus. *J. Laryngol. & Otol.*, 1937, 52: 733.

The present summary is based on 100 consecutive cases in each of which a portion of the growth was removed through the bronchoscope, and its malignant nature demonstrated histologically. Of the 100 patients, 92 were men and 8 were women. Their average age was fifty-one and seven-tenths years. There was a slight but definite preponderance of cases on the right side: 58 on the right and 42 on the left.

For inclusion in the list, all the tumors must have had at least an intrabronchial portion, so that specimens could be removed for biopsy, but in many the extrabronchial portion was greater. The appearance of the tumors seen bronchoscopically varied from the smallest nodule to a cauliflower-like mass completely filling the main bronchus. The majority of the tumors had an irregular granular surface, somewhat paler than the normal bronchial mucous membrane, and on removal of a portion for examination they were found to be extremely soft in consistency. A few were harder and of a deeper red and in one or two instances the tumor was so firm that it was difficult to obtain a portion for microscopy. They showed only a slight tendency to bleed when a portion was removed, in contrast to the benign tumors, which all bled freely when cut.

It is an interesting fact that on passage of the bronchoscope into the bronchus after routine cocainization, there is very little tendency to cough in normal cases, as well as in cases in which a neoplasm is present. In the case of an inflammatory disease, such as bronchiectasis or lung abscess, it is more difficult to abolish the reflexes, and there is a considerably greater tendency to cough.

Malignant disease of the lung must be differentiated from bronchiectasis, lung abscess, gumma, mediastinal tumor, and benign tumor of the bronchus.

The 100 cases under review included 62 cases of squamous-cell carcinoma and 38 cases of non-squamous-cell carcinoma. The two types pursue the same clinical course; the average age, however, of the squamous-cell carcinoma is about five years more than that of the other type. There is also a greater tendency to degeneration and cavity formation in the squamous-cell type. When the results of the treatment were discussed there appeared to be some slight difference in response, but a much larger series of cases would have to be investigated before any very definite conclusion could be reached.

The large majority of the patients seen were too far advanced to permit lobectomy and pneumonectomy and it was found necessary to attempt the destruction of these growths by less radical procedures, such as the introduction of radon into the bronchus or the insertion of seeds directly into the tumor mass. In spite of certain advantages of the direct implantation of seeds over the use of containers, the majority of the patients who have survived more than one year were treated by means of containers; however, some very long survivals have been achieved from the direct insertion, fifty-three months in one case. Both methods have their place, and a decision as to which shall be used can be made only after bronchoscopic examination. The object of the treatment is twofold: to destroy the growth and to open up the bronchus and drain and aerate the lung distal to the obstruction. Of the 100 cases under review, 28 were untreated and 72 were treated. Sixty-seven were treated with radon, 4 were referred to a surgical clinic for operation, and 1 was subjected to diathermy. The 4 patients who were operated upon died within a short time; the patient treated by diathermy lived for eleven months. Among the cases treated by radon there were a number of strikingly successful results. The average life of the untreated patients was three and five-tenths months and of the treated patients seven and eight-tenths months. The squamous-cell growths appeared to have a slightly longer life than the non-squamous. It is believed at the Brompton Hospital that when there is not a reasonable prospect of complete removal of the growth by surgical measures, radon treatment should always be carried out except when the patient is obviously dying.

JOSEPH K. NARAT, M.D.

Koster, H., Kasman, L. P., and Rosenblum, J.: A Suggested Method for More Rapidly Curing Empyema. *Ann. Surg.*, 1937, 106: 992.

In the past fifteen years aspiration, closed continuous drainage, open thoracotomy with or without rib resection, irrigation with various types of solutions, and air replacement after aspiration have been advocated for empyema.

The authors have treated, between 1929 and 1934, 118 cases with rib resection and open drainage. All of the patients were operated upon under spinal anesthesia. An opening large enough to admit inspection and digital examination was made, the cavity was thoroughly emptied by suction, a drainage tube was placed in the cavity, and the wound was packed. Five patients had a prolonged convalescence because of complications. The other 113 had complete recovery in an average of forty-five days.

A new method of treatment of empyema has been presented by the authors, which consists of closed drainage with the production of compression of the contralateral lung by artificial pneumothorax. From seven to ten days after the termination of the active pneumonic process, closed intercostal drainage was instituted. From two to three days later artificial pneumothorax was produced on the unaffected side of the chest. Air was then injected and the pneumothorax was maintained by repeated injections under roentgenographic and fluoroscopic control. Immediately after the production of the pneumothorax the patient breathed deeper and more rapidly. A copious discharge from the drainage tube followed a short time later. In adults the average duration of drainage was twenty-one and two-tenths days, and the average duration from the beginning of drainage to healing was twenty-five and one-half days.

It was found that even in cases of empyema, tidal air was not diminished by producing a pneumothorax artificially on the side opposite the empyema.

J. Daniel Willems, M.D.

HEART AND PERICARDIUM

Blalock, A., and Levy, S. E.: Tuberculous Pericarditis. *J. Thoracic Surg.*, 1937, 7: 132.

The authors report 42 cases of tuberculous pericarditis from the Vanderbilt Hospital during the past eleven years. In 24 cases the diagnosis was proved, and in 18 it was strongly suspected.

The cases are divided into four groups for the purpose of analysis:

Group I was composed of patients with active tuberculous constrictive pericarditis on whom pericardiectomy was performed. There were 6 patients, all males. All had been ill for months. With one exception they were forty years or more of age. The chief complaint was dyspnea and cough. All had prominent veins, with a venous pressure ranging from 195 to 300 mm. of water, a paradoxical pulse, a low pulse pressure, distant heart sounds, a fixed heart with little or no visible pulsation under the fluoroscope, an enlarged liver, pleural effusion, and ascites. All had marked thickening of the pericardium and epicardium, and 1 showed a moderate amount of calcification. Large areas of thickened scars were removed in all instances and microscopic study revealed active tuberculous infection. Three of the 6 patients were cured or greatly benefited, and 3 died; 2 died of miliary tuberculosis months after operation, and 1 died a few minutes after operation.

Group II was made up of patients in whom tuberculous pericarditis was the chief cause of death, but on whom pericardiectomy was not performed. This group consists of 7 patients. All died and autopsies were performed on 6 of them. The complaints were similar to those in Group I. Drainage of the pericardium was carried out on 2 patients, and large quantities of fluid, 400 and 1,000 c.cm., were removed. Tuberculous pericarditis was not the only lesion in these patients. All of the autopsies revealed tuberculosis of the mediastinal lymph nodes, and there was active pulmonary infection in all but 2.

Group III was composed of patients with proved tuberculous pericarditis which was a contributing but not the chief cause of death. In this group there were 9 patients. Seven were males; and the ages ranged from two to sixty years. The duration of illness varied from two weeks to two and one-half years. Eight of these patients showed systemic congestion; 1 had an acute effusion, with 500 c.cm. of fluid in the pericardial cavity at autopsy. Aspiration of the pericardium was attempted in 3 patients, 2 of whom yielded fluid which was found to be positive on guinea-pig inoculation. The third died of hemopericardium following aspiration. The causes of death were: acute disseminated tuberculosis in 5 cases; pneumococcal pneumonia in 1; pyogenic bronchopneumonia in 1; cardiac hypertrophy and dilatation with multiple infarcts in 1; cerebral tuberculous meningitis in 1; and hemopericardium in 1. Autopsy was performed in 8 cases.

Group IV. The patients in this group were strongly suspected of having tuberculous pericarditis, but its presence was not proved. There were 15 males and 3 females. The ages varied from twenty to sixty years. The complaints were dyspnea, cough, pain in the chest, and edema. The duration of illness varied from one day to many years. Ten of the patients had a pericardial rub. There was enlargement of the heart, a pericardial shadow in 15 patients, and a paradoxical pulse in 8. Eight of the patients died, but there was no autopsy; 3 are partially and 2 are totally incapacitated, and 4 are well. J. Daniel Willems, M.D.

Benedetti-Valentini, F.: A Contribution to the Surgical Treatment of Pick's Syndrome (Contributo al trattamento chirurgico del morbo di Pick). *Policlin.*, Rome, 1937, 44: sez. prat. 1986.

The author presents a case of Pick's syndrome secondary to a tuberculous polyserositis with involvement of the pericardium. The patient was a

sixteen-year-old boy who, when seen at the clinic, presented the picture of a severe polyserositis involving the pleura, pericardium, and peritoneum. After repeated paracenteses and pericardial punctures the condition of the patient became progressively worse although the general ascites had retrogressed. After subsidence of the acute symptoms the patient developed a veritable cardiohepatic cirrhosis with ascites, Pick's syndrome. Following a severe convulsive seizure marked by contractions of the left facial musculature and by ocular deviations, the author, upon the patient's request, decided to interfere surgically.

Under morphine and local novocain anesthesia a horseshoe incision was made and following resection of the third to the ninth ribs the pericardial space was freed and a capillary drain was introduced which was removed after twenty-four hours. This is called the Brauer operation. The immediate postoperative condition of the patient was fair, but within twenty-four hours the patient's condition became progressively worse. A paracentesis was made and about 4 liters of fluid were removed after which the condition rapidly improved.

Encouraged by the good results obtained from surgical intervention, the author decided to complement the operation with a left phrenicoexeresis. This procedure has proved always to be very useful in the hands of those surgeons who have applied it in the treatment of adhesive pericarditis or as a preliminary step in precordial thoracocectomy. In this case the author performed a phrenicoexeresis following Brauer's operation for the first time.

Under local anesthesia of the cervical plexus, an incision 4 cm. long was made above the clavicle with its center at the level of the posterior border of the sternocleidomastoid muscle. The phrenic nerve was identified and excised and the patient made an uneventful recovery. When seen again after eight months, the boy reported that he felt considerably better.

With reference to the surgical method to be chosen in cases of Pick's syndrome developing in the course of a tuberculous polyserositis, the author gives preference to (1) a rapid, efficacious and least shock-producing surgical intervention, and (2) an intervention which is least apt to mobilize and disseminate tuberculous foci. He believes, therefore, that the operation should be performed extrapericardially. RICHARD E. SOMMA, M.D.

ESOPHAGUS AND MEDIASTINUM

Ellison, R. T.: Mediastinal Hernia. *Radiology*, 1937, 29: 556.

The author has reviewed the origin of mediastinal hernia and considered the mechanism of its development. Mediastinal hernia is defined as a projection through the mediastinum of one pleural space into the other hemithorax. Artificial pneumothorax is still the most common cause of hernia of the mediastinum, although the latter also occurs in spontaneous pneumothorax. There are two so-called "weak spots" in the mediastinum. One lies between the sternum and the front of the heart at the site of the atrophied thymus; the second lies further below and posteriorly and is a space bounded below by the crura of the diaphragm, posteriorly by the spinal column, and in front by the esophagus as it bends forward to pass through the diaphragm. What are the physical factors that lead to the development of such a herniation of the mediastinum? It is obvious that the mediastinum itself must be considerably more rigid than the "weak spot"; otherwise the mediastinum as a whole would be shifted with the lowest pressure. A difference of pressure on the two sides of the mediastinum can be brought about in either of two ways: either the pressure on one side can be raised above normal, or the pressure on the other side can be lowered below normal. The author gives a discussion of the physical forces which cause this phenomenon.

The traction type of hernia of the mediastinum is much less common; in this type the forces causing the herniation are due to a loss of volume of one lung and an increase in the negative pressure in that hemithorax, so that the lung from the normal hemithorax is drawn through the mediastinal "weak spot." The author gives a case report illustrating this type of herniation. PAUL MERRELL, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Jonsson, S. O.: Torsion of the Omentum (Ueber Omenttorsionen). *Acta chirurg. Scand.*, 1937, 80: 251.

Torsion of the omentum is one of the rare acute conditions treated by abdominal surgery, though hardly as rare as it would appear from the statistics to be found in the literature (Morris, 1932; 217 cases). In the last ten years the author has found 6 cases at the Serafimerhospital and 1 at the Örebro Hospital. The predisposing factors are abnormal bulkiness and weight of the omentum, and adhesions along its free border, which cause a drag and lead to pedunculation. These factors are present especially in cases of hernias containing omentum, and torsions of omentum are therefore often combined with epiplocele. Acute infiammatory processes can also be the cause of torsion, though probably only when pedunculate extensions, which are not uncommon in the right part of the omentum, already exist.

The usual distinction, and probably the best from a clinical point of view, is between (1) torsion only in the hernial sac; (2) torsion both in the hernial sac and in the abdominal cavity; and (3) torsion without hernia, (a) unipolar, (b) bipolar.

Torsion of the omentum has been correctly diagnosed before operation only in a very few cases. If the abdominal symptoms predominate, the case is diagnosed as acute abdominal disease, usually as appendicitis; if the hernial symptoms predominate, the case is judged to be one of incarcerated hernia. The author calls attention to the danger of confusion, in the former case with appendiceal abscess, and in the latter with incarcerated hernia; and warns especially against the danger of error when the torsion is double, with one spiral in the hernial sac and another proximal to this, at the place where the omentum is adherent to the colon. The author believes that in all cases of torsion in the hernial sac and, for that matter, in any case of torsion in the peripheral part of the omentum, the operating surgeon should make sure, by a laparotomy incision if necessary, that there is not another torsion higher up. He believes this should be ascertained regardless of the appearance of the abdominal exudate and of the omentum above the peripheral torsion. He is confirmed in this opinion both by his own case and by several cases in the literature.

The other 6 cases related by the author belong to the group of simple abdominal torsions. The cause in one case was hernia although at the operation the hernial pouch was found to be empty; in another it was lymphangioma in the omentum; in a third possibly acute appendicitis; and in the remaining 3 cases the condition was idiopathic. In connection with 1 of the cases, the author briefly discusses the similar disease, torsion of the epiploic appendages. He calls attention to the fact that torsion of the omentum can give rise to a more chronic pathological picture, with recurring abdominal pains suggesting chronic appendicitis.

Harris, F. I., and White, A. S.: The Length of the Inguinal Ligament. *J. Am. M. Ass.*, 1937, 109: 1900.

There is a definite relationship between the length of the inguinal ligament and the occurrence of either a direct or indirect inguinal hernia. Individuals with an inguinal ligament less than 11 cm. in length have very little tendency to acquire an inguinal hernia.

Hernias occurring in individuals whose inguinal ligament measures from 11 to 15 cm. are of the indirect type. Hernias occurring in individuals whose inguinal ligament measures from 15 to 19 cm. are always of the direct type.

Recurrences following the repair of inguinal hernia are more frequent in patients with long inguinal ligaments.

The longer the inguinal ligaments are, the shorter is the relative distance between the anterior superior iliac spines. In such cases the pelvis is of greater depth. Conversely, the shorter the inguinal ligament, the more shallow is the pelvis. In indirect hernias the pelvic floor is relatively flat and the intra-abdominal pressure is exerted more evenly over the entire inguinal ligament. In direct hernias the pelvic floor is markedly inclined, and the intra-abdominal pressure is exerted more particularly near the midline. This seems to explain logically the formation of direct inguinal hernias in patients with long inguinal ligaments. SAMUEL KAHN, M.D.

GASTRO-INTESTINAL TRACT

Andersen, M.: Gastrographic Studies and the Administration of Food Through a Duodenal Tube. *Acta med. Scand.*, 1937, 93: 437.

In order to obtain tracings in experiments with the administration of food through a duodenal tube, a thin rubber balloon was tied around a small tube and passed into the stomach; it was then inflated with air and the other end of the tube, which was connected to a Marey's tambour, made tracings on a kymograph. These recorded tracings or gastrograms showed characteristic features: (1) small waves synchronous with the respiratory movements; (2) larger waves differing in height and length, produced by contractions of the stomach; (3) irregular, sporadic waves which were produced by the patient when he was moving, speaking, coughing, or sighing.

Normal individuals as well as those with gastroduodenal pathological conditions gave curves of an essentially uniform appearance, but the waves appeared slightly higher in those who were not normal.

A difference was found between the contraction waves of an empty stomach and those of a full stomach. The empty stomach showed varying contraction phases; that is, beginning with relatively small waves, the contractions increased in frequency and intensity to maximum, or so-called "hunger contractions." After a certain period of time this phase turned rather suddenly into a phase of "absolute rest." The appearance of the curve changed when the stomach was filled to a certain degree, and showed lower, wider waves, or so-called "relative rest." The longest "relative rest" was produced by meals rich in protein and fat.

Normal persons had contraction phases without any pain, but individuals with gastroduodenal pathological conditions were found to have pain when the contraction phase occurred. Hunger pains were dependent exclusively on movements of the stomach, especially the empty stomach, and bore no relation to the acidity of the stomach contents.

These findings suggested frequent filling of the empty stomach and thus conflicted with the theoretical basis of feedings, through the duodenal tube. This fact led to the following investigations and results:

Fasting patients were used for these experiments. The roentgenogram was used to determine when the duodenal tube had been introduced into the small intestine, to a suitable level, it having been introduced prior to the experiment. The gastrographic tube was introduced into the stomach at the beginning of the examination. The gastrographic balloon was filled with air and the tracings of the movements of the stomach began.

Every examination began with tracings of typical "hunger contractions." After these had been recorded for about five or ten minutes, the patient was given from 200 to 300 c.cm. of an "intestinal meal." An intestinal meal consists of 100 gm. of olive oil, 30 gm. of wheat flour, and 50 gm. of sugar, stirred together with 300 gm. of water. After the mixture has been boiled and cooled, 6 beaten eggs (300 gm.), the juice of ½ lemon (15 gm.), and 1,250 gm. of raw whole milk are added. This makes an average portion for one day, and is given in from five to ten meals.

The results were quite uniform in all the cases; namely, "absolute rest" occurred immediately. This phase started immediately after the beginning of the food injections into the duodenum.

The duration of the "absolute rest" was found to be highly variable, ranging from twenty minutes to three hours and twenty minutes. The resting period was followed by a period of relatively weak contractions which resembled the contractions which were recorded with a full stomach and designated as "relative rest." Later these contractions turned into typical "hunger contractions." In the 6 cases examined, the total duration of the resting periods was from thirty minutes to more than three hours and forty minutes. After a new period of hunger contractions had been recorded a new injection was given through the duodenal tube; the immediate appearance of "absolute rest" again resulted.

The author was able to show that the ingestion of food brought about a state of "relative rest," whereas the introduction of the intestinal meal into the duodenum gave "absolute rest." It seems that the introduction of the food through the tube into the duodenum produces, by way of reflex action, a complete cessation of the stomach contractions. From these findings it would seem that therapy by means of duodenal tube should be considered in gastroduodenal disease.

RICHARD J. BENNETT, JR., M.D.

Allen, A. W.: Acute Massive Hemorrhage from the Upper Gastro-Intestinal Tract. *Surgery*, 1937, 2: 713.

Few conditions create more uncertainty and alarm than the rapid loss of large quantities of blood from the gastro-intestinal tract. The patient with little or no nausea may suddenly vomit a basinful of blood, or upon a sudden desire to defecate may yield a large liquid stool tarry black or even showing bright red blood. He may exhibit varying degrees of shock with pallor, sweating, restlessness, and rapid pulse.

In a previous study of 371 bleeding duodenal ulcers occurring over a ten-year period at the Massachusetts General Hospital, Allen found that 22.6 per cent of the patients had hematemesis only, 38.3 per cent had melena only, and 39.1 per cent had both hematemesis and melena. While the most frequent source of such massive hemorrhage from the upper gastro-intestinal tract is the duodenal ulcer, there are several other types of lesions which produce the same picture. These are gastric ulcer, gastric carcinoma, gastrojejunal ulcer, esophageal varices, leiomyosarcoma, and hypertrophic gastritis.

DUODENAL ULCER

During a ten-year period, the diagnosis of duodenal ulcer was made in 1,002 ward patients. Of this number, 390 had gross bleeding while under observation. Ninety-four bled profusely, in sufficient amounts to produce shock and acute anemia. Forty-eight were classed as severe bleeders. All these patients were found to have a red blood count below 3,000,000 and hemoglobin below 70 per cent. Thirteen of these patients bled to death. In an analysis of the cause of fatal bleeding, the writer found that the age of the patient was a most important factor. Thus in 90 patients who were under fifty years of age and who bled profusely, only 4 died. Among 42 patients over fifty years of age, 14 or exactly one-third, died of hemorrhage. Further, it was found that if operation was delayed for a week or more in a patient continuing to bleed either constantly or repeatedly every day or two, he was not saved by surgery regardless of what was done. Nine of 20 patients with massive hemorrhage died during their first period of bleeding.

In the early hours of acute massive hemorrhage from duodenal ulcer, if the patients are under fifty

years of age with elastic blood vessels, conservative measures are indicated, because it is unlikely that they can be operated upon and the vessels be ligated with a mortality of less than 5 per cent. In the older age group, we can use Finsterer's much quoted forty-eight-hour time limit to advantage.

The deep penetration of the posterior-wall ulcer into pancreatic tissue, at a point where the gastroduodenal artery traverses it, increases not only the risk of continued bleeding but makes any operative procedure one of major consideration. One can hardly expect to open the anterior wall of the duodenum and successfully place ligatures in this friable ulcer bed, nor can one pass stitch ligatures in such a way as to occlude the vessels in healthy tissue from within. This method has succeeded only in isolated instances. Finsterer advocates direct tamponade in some extensive ulcerations into the pancreas with a later secondary resection after recovery from acute blood loss and shock. In a large group of patients with active bleeding ulcer, he has successfully ligated the bleeding vessels and resected the distal two-thirds of the stomach with a low 5 per cent mortality if the operation was undertaken within forty-eight hours after the onset of the bleeding. In the patients with ulcers bleeding one week or more, the mortality has been 30 per cent. Finsterer apparently believes that by excluding the extensive, deeply penetrating ulcer on the posterior wall of the duodenum, by transection of the duodenum proximal to the ulcer, or by transection of the antrum 2 fingerbreadths from the pylorus, and then by removing the distal two-thirds of the remaining stomach, his end-results are nearly as good as when the ulcer in the duodenum is included in the resection. Finsterer calls this operation "resection for exclusion." The author is of the opinion that in doing this operation the radicles leading into the ulcer bed are ligated. Many surgeons have found gastro-enterostomy a failure for the treatment of massive hemorrhage in duodenal ulcer.

In the quiescent or interval stage of duodenal ulcer of the posterior wall, especially after one or more episodes of massive bleeding, one is confronted with the problem of proper treatment. If the patient is young and responds well to a dietary regimen, we may justly consider that radical surgery is meddlesome. Certainly some of these patients manage to get along comfortably and safely for many years. In those individuals with recurrences of massive hemorrhages, we believe that radical surgery makes possible a safer and more comfortable life. In 38 consecutive cases of duodenal ulcer of the posterior wall, the author resected the distal one-third or two-thirds of the stomach and when possible the ulcer-bearing portion of the duodenum, and followed this with a posterior Polya anastomosis. All of the 38 patients had bled severely, but all recovered from the operation and remained well for varying periods of time. Some of them developed new ulcers either at the stoma or on the lesser curvature of the remaining portion of the stomach. In each case of newly formed ulcer, there have been episodes of hemorrhage. None of these patients have thus far died from hemorrhage. They were undoubtedly protected from fatal bleeding by the ligation of the large vessels overlying the head of the pancreas. However, their ulcer diathesis and their hemorrhagic tendency as well have not been altered. The author is now trying a more radical resection of the stomach.

Details as to the conservative management of massive hemorrhage have not been considered a part of this discussion. However, certain aspects demand consideration. The author has never seen a patient die as a direct result of a blood transfusion, but we have all seen patients die from the lack of a transfusion. Everyone is in accord with regard to the importance of blood replacement. Sedation of the actively bleeding patient has been a questionable procedure. Finsterer warns against too much morphine in these depleted patients prior to operation; however, the restless stage of shock may be decidedly harmful, and doubtless there is a proper middle course. An inlying Levine tube may be worthy of consideration. The tube allows aspiration of gastric and salivary secretion, which may hinder clot formation. It serves to identify fresh episodes of bleeding. Without doubt, it serves to minimize peristaltic activity and eliminates vomiting, which in itself may dislodge a life-saving thrombus in an open vessel. The entire basis of treatment consists of perfect rest, quiet, and comfort.

JOHN W. NUZUM, M.D.

Golden, R.: Antral Gastritis and Spasm. *J. Am. M. Ass.*, 1937, 109: 1497.

The author presents a discussion of gastritis and its roentgenological interpretation. The cause of the condition is unknown. It begins in and may be limited to the mucosa but frequently extends to the deeper layers. It has been pointed out that as far as the motility is concerned, the antrum is the most important part of the stomach and consequently inflammatory changes in this region may produce serious disturbances in gastric function. This condition has been termed "antral gastritis" and may produce any or all of the symptoms of peptic ulcer, such as pain, hemorrhage, and vomiting. The diagnosis depends mainly on gastroscopic and x-ray examination. Some writers have noted that in many cases there are no changes which can be demonstrated by the x-rays, but the author is convinced that certain cases may be recognized with the x-rays by a study of the changes in the gastric form and function.

Normally, as the narrow peristaltic wave enters the antral region, its relaxing edge decreases and its contracting edge increases in speed; in this way a portion of the lower end of the stomach is closed off. This results usually in expulsion of the gastric contents. Then the wall relaxes promptly and the lumen returns to its normal width and contour. This is known as "antral systole." The author's observations suggest that antral systole is associated with

contraction of the longitudinal muscle toward the pylorus. In the normal stomach the mucous membrane is freely movable over the muscle. Forssell has demonstrated that the formation of mucosal folds is the result of the contraction of muscularis mucosæ. In some cases the mucosal folds in the antrum run irregularly in a transverse direction, and when antral systole occurs they appear to change direction and run nearly parallel with the long axis of the stomach. For this change to take place there must be a movement of the mucous membrane in a cephalad direction which stretches it tightly beneath the muscular contractions. Failure of this mechanism may account for the occasional observation of herniation of the prepyloric mucosal folds through the pylorus.

Movement of the mucous membrane may be disturbed by inflammatory changes of the muscularis mucosæ and the submucosa. Edema of the mucosa has been frequently noted. Changes about and within the ganglion cells may interfere with the function of the mural nerve plexuses. In any event, the following disturbances in motility have been observed:

1. Peristalsis may be very irregular in depth and timing. The waves seem stiff and fail to develop into antral systoles.
2. Prepyloric narrowing due to spasm may be present.
3. Pylorospasm may be present.

In addition there is frequently delay in emptying and there may be mucosal erosions.

There is evidence to indicate that gastritis is an important factor in the production of hypertrophy of the pyloric muscle. The most important x-ray sign in this condition is elongation of the pyloric channel with preservation of the mucosal folds.

The differential diagnosis of antral gastritis from carcinoma may be difficult. Pressure methods to demonstrate mucosal folds in the narrowed area are particularly helpful. Ordinarily the folds are obliterated by an infiltrating carcinoma. If atrophic changes are present the diagnosis becomes even more difficult. A palpable mass in the antral region favors the diagnosis of carcinoma. The writer has found atropine of little value in the study of these cases but recommends gastric lavage and repeated examination. If doubt persists, however, operation is advised. JOHN A. GIUS, M.D.

Morley, J.: Carcinoma of the Stomach. *Brit. M. J.*, 1937, 2: 949.

The author discusses the theories concerning the cause of carcinoma of the stomach. He points out that 82 per cent of chronic ulcers of the stomach but only 13 per cent of gastric carcinomas occur in the middle two-thirds of the lesser curvature. On the other hand, only 12 per cent of chronic ulcers occur in the prepyloric region, while 66 per cent of the gastric carcinomas occur in that region. This is given as evidence against the contention that carcinoma is secondary to chronic ulcer. Furthermore, the average duration of symptoms in the author's series of cases of carcinoma was twelve and seven-tenths months as compared to ten and three-tenths years in cases of ulcer. It is not denied that malignant transformation in an ulcer may occur, but it is less frequent than is often stated. The author does not hold to Hurst's view that chronic gastritis is a common predisposing cause of carcinoma.

Carcinoma of the stomach is classified according to location: (1) carcinoma of the cardiac end of the stomach, (2) carcinoma of the body of the stomach, and (3) pyloric and prepyloric carcinoma. The symptoms depend to a great extent on the location of the lesion.

The earliest symptoms of carcinoma of the stomach usually are a vague discomfort after meals and an unaccountable failure of appetite. The patient is usually over forty years of age and has not suffered from indigestion before. With the failure of appetite there is a steady loss of weight and, as a rule, a progressive development of anemia.

In carcinoma of the cardiac end of the stomach, there is commonly an early onset of dysphagia due to stenosis of the cardiac orifice. Only a roentgenological examination will differentiate this condition from carcinoma of the lower end of the esophagus.

Obstruction is most unusual in lesions of the body of the stomach. In some patients loss of appetite may be the only early symptom. Other patients may have a feeling of flatulent distention of the stomach and eructation of gas with an offensive odor. Anemia and weakness are progressive, as well as loss of weight. X-ray examination reveals the lesion or confirms the diagnosis.

Lesions of the pyloric end of the stomach are most common and most hopeful. They are hopeful because the obstruction often occurs early and the growth is accessible for surgical removal. In the presence of stenosis, pain is the most marked feature. Visible peristaltic waves may be seen in some patients. A palpable mobile tumor is not a contraindication to surgery in the opinion of the author.

Late symptoms are secondary deposits of tumor in the liver and peritoneum. In each sex the pouch of Douglas should be examined for hard secondary tumors. In the female a pelvic examination may reveal large secondary ovarian masses known as Krukenberg tumors. Jaundice and ascites are very late symptoms of metastases.

The differential diagnosis may at times be difficult. In pernicious anemia the distress after taking food is slight or absent and rapid loss of weight is rare. Examination of the blood and x-ray studies will confirm the diagnosis.

Simple peptic ulcer may simulate a carcinoma of the stomach, and *vice versa*. If x-ray examination shows the lesion on the duodenal side of the pylorus, then the presence of an ulcer is assumed. Failure to heal after adequate treatment for about three weeks and the persistence of blood in the stool justify surgical interference.

Gastrectomy is the treatment of choice when feasible. Gastro-enterostomy to relieve obstruction may be the only surgery possible. At times surgery is not advisable either because there is no obstruction and the lesion cannot be removed, or because the patient cannot stand a surgical procedure.

EARL O. LATIMER, M.D.

Gordon-Taylor, G.: The Problem of the Bleeding Peptic Ulcer. *Brit. J. Surg.*, 1937, 25: 403.

This article is essentially a presentation of the surgical attitude on the bleeding of chronic ulcer. The subject is considered under the ten following subdivisions:—

1. "The role of surgery as a prophylactic measure." The prevention of hemorrhage has often been presented as an especially powerful argument in favor of early surgical intervention for peptic ulcer. The correct answer as to whether surgery really is a prophylactic measure against a possible hemorrhage in patients with a chronic peptic ulcer of the stomach or duodenum depends upon such relative considerations as:
   a. The incidence of severe hemorrhage in patients with chronic peptic ulcer.
   b. The risk to life associated with the hemorrhage.
   c. The prospective protection afforded by the operation against hemorrhage.
   d. The mortality of that particular surgical measure which seems to promise the highest degree of protection against future bleeding.

The first of these, or the incidence of hemorrhage, is answered by Gordon-Taylor from the available statistics which show that approximately 10 per cent of all patients with chronic peptic ulcer suffer from hemorrhage, although a history of hematemesis or melena may be obtained in from 20 to 25 per cent of the more severe cases of ulcer admitted to private or public hospitals.

The second of these considerations, or the risk to life from ulcer hemorrhage, is extremely difficult to determine because of apparently conflicting statistics. Much difference of opinion occurs on what really is severe ulcer bleeding, and Gordon-Taylor concludes that "The chances run by the possessor of a chronic peptic ulcer of succumbing to hemorrhage from ulcer are not likely to be greater than 1 in 80, and no worse than 2.5 per cent if consideration is limited to those ulcer patients whose condition is such that they require hospitalization."

The third of these factors, or the prospective protection afforded by operation against hemorrhage, is answered by the conclusion that there is no type of operation which will give absolute assurance. The author has had 3 patients who had never bled prior to operative interference and who experienced hemorrhage for the first time only after the duodenum and a considerable portion of the stomach had been resected.

The fourth consideration, or the prospective mortality of a difficult operation to prevent hemorrhage from a peptic ulcer, is met by the argument that such a mortality will of course vary with the nature of the procedure and the experience, skill, and judgment of the surgeon, as well as the patient's general condition. In experienced and competent hands resection and resection for exclusion have a mortality of somewhat over 3 per cent. This is the acme of surgical skill and experience. This figure is, however, at least as great as, and may be greater than, that of deaths from hemorrhage in cases of peptic ulcer.

The final conclusion on this first heading of prophylaxis by Gordon-Taylor is, "Operation undertaken solely on grounds of prophylaxis against bleeding is therefore to be discountenanced."

2. Under the second heading, or "The Place of Surgery in Non-bleeding Cases with a History of One or More Hemorrhages," the author states that every case should be considered on its own merits. Gordon-Taylor realizes that surgery does not afford complete immunity from future hemorrhage and concludes that a mere history of a single hemorrhage in a patient known to have a chronic peptic ulcer is not an indication for surgery, but in every case the final determination to operate should probably rest upon the degree of ill health, and the inability of the patient to earn a livelihood.

3. The third consideration, or "Cases Presenting a First Hemorrhage," tells us that these cases also are not to be governed by hard and fast rules. Therapy should be guided by consideration of each case separately. A policy of armed expectancy should be adopted.

4. The fourth consideration, or "Cases Presenting a Second or Later Hemorrhage," states that these cases call for an immediate consultation between physician and surgeon even despite the fact that subsequent hemorrhages have been known to follow operation. The bias of the consulted opinion should veer toward surgical intervention, which should be of a very radical character.

5. The fifth subject under consideration was, "The Question of Operation During Active Bleeding or After Its Cessation." In 40 per cent of the fatal cases death takes place within three days and in 25 per cent on the third day itself. The hemorrhage period of chronic bleeding ulcer usually lasts for several days, and it is the rapid recurrence of bleeding which may prove fatal.

6. The treatment of the last group of patients is considered under "A Suggested Outline for the Treatment and Indications for Surgery in Cases of Hematemesis." The first step in therapy should be the immediate preparation of donors so that even one-half gallon of blood of the same or a suitable group can be available should necessity arise. If the bleeding is more than slight as determined by the pulse rate of 100 or more, and the hemoglobin estimate at 50 per cent, drip transfusion should be instituted immediately. Every case of hematemesis should be admitted to a fully organized and equipped hospital where immediate transfusion is possible. The indications for surgery are:

a. An immediate operation when it becomes obvious that a large blood vessel has been eroded.
b. Immediate operation in the rare case of concomitant hemorrhage and perforation.
c. Early operation in those ulcer hemorrhages in which drip transfusion is failing to control the hemoglobin because moderate bleeding is continuing.
d. When the hemoglobin has reached 60 per cent the following type of patients should be operated upon:
   (1) Patients with large penetrating ulcers whether bleeding be slight or severe and despite a short history.
   (2) Cases with a long and definite ulcer history whatever the degree of bleeding, because the ulcer will be fibrotic and there will be ulceration of a definite vessel.
   (3) Cases of pyloric or duodenal stenosis with slight or severe bleeding.
   (4) Certain cases of midgastric narrowing.
   (5) Cases in which a second hemorrhage has occurred within a year and where there is even only a probable ulcer history. If the second hemorrhage has followed soon after the first the indications are even more cogent.

In all these clinical types delay in operation may be associated with grave perils. *Every case must be considered on its own merits. There can be no hard and fast rule.* Antecedent disease and intercurrent illness, the previous habits of the patient, his physical conformation, all of which determine whether the patient is a good or bad surgical risk, must be carefully evaluated; the personal courage of the patient as well as of the surgeon, the environment of the case, and the technical skill of the surgeon, all are factors which should not only influence the physician and surgeon in determining the desirability of surgery, but may also dictate the technique appropriate to every case.

7. "Nature of the Surgery Employed." The object of surgery is to arrest hemorrhage, and Gordon-Taylor has at times availed himself of such varied surgical measures as gastrostomy or duodenotomy with ligature of the bleeding vessel or vessels; pyloric exclusion and gastrojejunostomy; cautery or diathermy of the ulcer and gastrojejunostomy; sleeve resection; gastrectomy, which may be local or partial; gastroduodenal resection; Finsterer resection for exclusion; exclusion of duodenal ulcer with some form of specific operation on the pylorus and jejunum. No one measure is routinely utilized.

A bleeding anastomotic ulcer may be treated by complex and complicated resection, or it may also be dealt with by an approach through the stomach wall. Despite the great uncertainty of the indirect operation as a measure for securing hemostasis in a bleeding duodenal ulcer, the author has achieved some of his greatest successes by gastrojejunostomy with pyloric occlusion.

The time factor is of greater importance, however, than surgical technique and perhaps almost as valuable as surgical judgment. Early operation is as important for success in hemorrhage as it is in perforation.

The importance of the anesthesia cannot be overestimated. If the operation cannot be completed under local or splanchnic anesthesia, gas-oxygen may be added.

Emphasis is also placed on avoiding heavy morphinization of these patients. The danger of lung complications in patients heavily dosed with morphine is a real menace. The cough reflex is the watch dog of the lungs and morphine and heroine have indirectly killed thousands by the abolition of this cough reflex.

8. "Results of the Surgical Treatment of Bleeding Chronic Peptic Ulcer" are summarized in four periods.
   a. The period of 1919 to 1924 was an interval characterized by the author as that of enthusiastic surgery for active ulcer hemorrhage. During this time 20 of 22 patients recovered from the operation, a mortality of 9 per cent. The operations were almost all early, in the first day or two of the bleeding, and many were done in the first twenty-four hours.
   b. During the period from 1924 to 1926, 10 patients with severe hemorrhage from chronic gastric or duodenal ulcer had a mortality of 40 per cent.
   c. The 1926 to 1933 interval is interesting in that the author was in consultation on 43 cases of chronic ulcer hemorrhage and operated on only 10. Eight of the patients recovered and the 2 who died were both patients operated upon after six or seven days of recurrent bleeding. In the remaining 33 cases there was a mortality of 24 per cent.
   d. From 1933 to 1937 surgery was utilized in 22 cases, of which 15 could be classified as early cases, some being operated upon within twenty-four hours. This group had only 1 death, which was due to bronchopneumonia. In the remaining 7 cases, all of which were late ones, 1 death followed a resection for a large penetrating duodenal ulcer which had perforated and had been sutured eight days previously. A second patient died from pneumonia, and a third from a separation of the suture line, probably due to devitalization of the tissues.

9. Under the ninth subdivision, or "Hematemesis and Perforation," which occurred in 9 patients, the author had 3 deaths, but fortunately this type of concomitant pathology is rare.

10. The final, or tenth subdivision, "Hemorrhage from Anastomotic Ulcer," was considered by Hurst's findings which have shown that practically 50 per cent of hospitalized anastomotic ulcers had bled, but that despite the severity of the hemorrhage only 1 of the 22 fatal cases was secondary to the bleeding. Because of this reputed low mortality, surgical intervention should be postponed unless the hemorrhage is very severe. Gordon-Taylor has found that severe bleeding from a jejunal ulcer may be con-

trolled by an exposure through the stomach, and on other occasions has successfully performed a gastric resection even though it proved complicated.

The author concludes that the problem of bleeding peptic ulcer is certainly not one of surgery versus medicine, although without doubt there is a group of cases which operation alone can save. He believes that the surgeon should not be excluded from the consultation until operation is decided upon as the last desperate measure. Indiscriminate operation cannot be too strongly condemned. Every case must be regarded as a special problem deserving of the most careful attention, and it is important to remember the "critical third day". The first forty-eight hours is the optimum period for surgical attack in the bleeding of chronic peptic ulcer.

SAMUEL J. FOGELSON, M.D.

Faltin, R.: Intestinal Knots (Einiges zur Kenntnis der Darmknoten). *Acta chirurg. Scand.*, 1937, 80: 1.

For a knot to form between two coils of intestine it is absolutely necessary for them to cross and for one coil to wind itself screwlike about the other in such a way that it passes through the opening partly surrounded by the crossing coils. If one coil winds around the other from the base to the tip, it does not form a true knot but a twist. Intestinal knots are classified according to the parts of the intestine involved: (1) knots of colon and ileum, (2) knots of the two parts of the colon, and (3) knots of the ileal coils.

Faltin divided the knots between the flexure and ileum into two groups. The two groups differ in the fact that in one the ileum winds "over" the flexure in the primary crossing, while in the second group it winds "under" the flexure. "Over" and "under" designate cephalad and caudad, respectively. In the first case a right screw results, and in the second case a left screw. Figure 1 shows why expressions such as "anterior" and "posterior" and also "ventral" and "dorsal" are wrong in the characterization

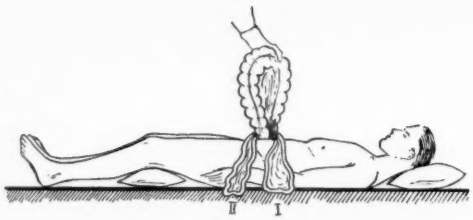

Fig. 4.

of the reciprocal position of the intestines in the primary crossing, and that only by the words "over" and "under" does the characteristic reciprocal position remain unchanged even after the reflection of the intestines outside of the abdominal cavity. Figure 4 shows how by vertical, sagittal elevation of the sigmoid flexure and observation of the type of the crossing with the ileum the group type can be determined in a simple manner before loosening of the knot. Figures 2 and 3 show the difference between a right and a left turn, and how these two turns can be corrected by supination of the corresponding hand. If a pronating movement of the right hand is necessary to detorsion of a turn it is a case of left turn.

A knot formation in a single ileal coil is theoretically possible but its occurrence has not been demonstrated.

LOUIS NEUWELT, M.D.

Strömbeck, J. P.: Terminal Ileitis (Ileitis Terminalis). *Acta chirurg. Scand.*, 1937, 80: Supp. 50.

Regional ileitis appears mostly in young persons and is characterized by its localization in the lowermost 5 or 10 cm., and exceptionally in the lowermost 30 or 60 cm. of the ileum. The most marked changes occur next to the ileocecal valve, which marks the distal involvement. In the early stage the involved intestine shows hyperemia and edema, occasionally

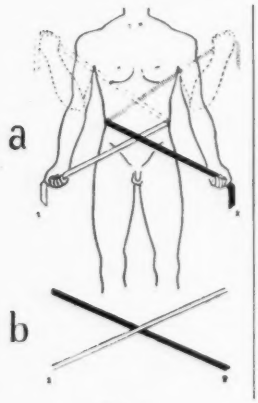

Fig. 1.

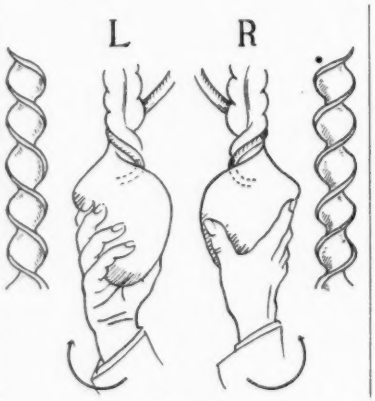

Fig. 2.

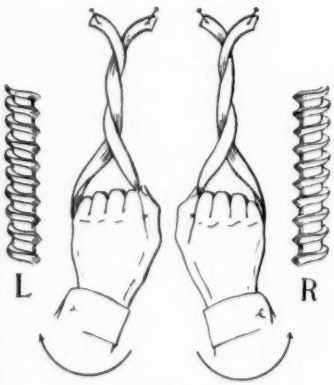

Fig. 3.

a fibrin deposit on the serosal surface, an ulcerated mucosa, phlegmonous mural changes, and hyperplastic glands in the adjacent mesentery. In more advanced cases the inflammatory process assumes a more chronic character, with mucosal ulcerations, fibrosis especially in the submucosa, round-cell and plasma-cell infiltrations, and also occasionally tubercle-like granulation tissue with foreign-body giant cells, but without necrosis, cheesy transformation, or calcification. Even in the early stages the lumen may be constricted by exudation and edema, but the stenosis is still more marked when shrinking and often marked wall thickening by fibrosis, cell infiltration, and muscle hypertrophy are added. Chronic perforation with abscess formation, fistulas from the ileum into adjacent adherent parts of the gut, or externally with drainage through healed appendectomy scars characterize the later stage of the disease.

Clinically, there are four disease pictures, which alternate or singly accompany the condition: (1) acute abdominal symptoms, usually interpreted as appendicitis; (2) symptoms suggesting ulcerative colitis, such as diarrhea, stabbing pains around the umbilicus or in the lower part of the abdomen, loss of weight, subfebrile temperature, and slight secondary anemia; (3) symptoms of stenosis; and (4) fistulas.

Later publications report similar changes in the jejunum, also in the colon together with terminal or regional ileitis. Occasionally it appears as if a primary ileitis had spread to and involved the colon in a secondary invasion. The changes in the ileum described by Crohn closely simulate the picture of inflammatory tumors of the colon and also that seen in rectal strictures resulting from lymphogranuloma inguinale. Additional experiences did not substantiate the statement of Crohn regarding the exclusive localization of the disease in the terminal ileum. The term "regional ileitis" or "terminal ileitis" was therefore replaced by "regional enteritis," "chronic cicatrizing enteritis," "localized hypertrophic enteritis," and "non-specific granuloma of the ileum and cecum." Nevertheless, the term "terminal ileitis" has been retained as an independent clinical disease picture, even though it is unlikely that the disease picture has a single cause.

It is very probable that an infectious, bacterial or toxic, origin underlies this disease, most likely of enterogenic character. It appears that several forms of primary virus may be the cause, although no special one can be designated. On the whole, the cause is still undetermined. Predisposing factors include constitutional factors and a reduced resistance to enterogenic infections.

Simple acute terminal ileitis rarely develops into the chronic form and it cannot be determined that the latter regularly has an acute initial stage. A common origin for both forms is induced by the peculiar functional conditions which prevail in the ileocecal region. The inflammatory changes develop most readily near the Bauhinian valve. The usual proximally arranged ulcerations, which in certain cases of chronic terminal ileitis are found along the insertion of the mesentery are secondary and probably develop as a result of mechanical conditions associated with the perforation of the intestinal vessels through the intestinal wall.

The most important diagnostic aid is roentgenography. In the early stage it is possible to reveal changes in the terminal ileal mucosa. Subacute cases show a moderate narrowing of the bowel, some local stasis, rigidity of the bowel wall, and a mucosal relief pattern of the fingerprint-depression type resembling that of polyposis. The chronic type shows (1) a filling defect just proximal to the cecum, (2) abnormality in contour of the last filled loop of ileum, (3) dilatation of ileal loops just proximal to the lesion, and (4) a "string sign" of the actual lesion. There are also spastic contraction in the cecum and adjacent colon. The "string sign" is not pathognomonic for ileitis, as it also appears in other stenosing processes, such as tuberculosis, lues, actinomycosis, and sarcoma.

The differential diagnosis includes appendicitis, ulcerous colitis, and ileocecal tuberculosis.

The surgical treatment of simple terminal ileitis is dictated by the difficulties of the differential diagnosis from acute appendicitis, and exploratory laparotomy is advisable on the slightest doubt. If perforation threatens, resection or the Mikulicz procedure is indicated. With thickening of the mesentery, ulcerations with a tendency to perforation and abscess and fistula formation should be suspected. Resection is then indicated. In less severe cases roentgenotherapy has given good results. Opinions differ as to the value of enteroanastomosis in chronic terminal ileitis. An abscess should be incised and drained, the normal procedure being the three-stage operation of drainage, ileocolostomy, and, finally, resection. Simple closure of the fistula is ineffective. The late results with sufficiently wide resection in healthy tissue are good.

LOUIS NEUWELT, M.D.

Crohn, B. B., and Berg, A. A.: Right-Sided (Regional) Colitis. *J. Am. M. Ass.*, 1938, 110: 32.

Right-sided (regional) colitis, as opposed to left-sided or universal colitis, is a disease that has its origin somewhere in the colon on the right side. It constitutes about 10 per cent of the cases of colitis, is progressive, somewhat less severe, and shows fewer spontaneous cures than the left-sided type. The disease, which may begin in any part of the colon on the right side, tends to spread upward and downward, and is retarded for various periods at the hepatic, splenic, and sigmoid flexures (Fig. 3).

Medical treatment in the hands of the authors has been disappointing and they believe that operation is indicated in all intractable cases. Since the operation that is utilized depends entirely upon an anastomosis with a healthy sigmoid, it becomes absolutely imperative to intervene surgically whenever the lesion shows a tendency to invade the pelvic colon; this segment makes surgery possible.

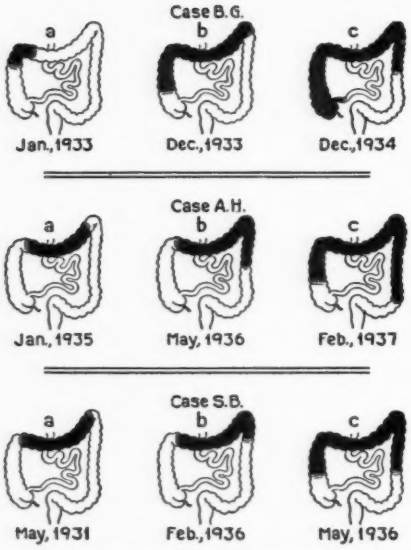

Fig. 1. Spread of the lesion. Progressive course or life history of regional colitis (diagrammatic).

The operative procedure is divided into two or three stages. In the first stage, healthy ileum is anastomosed to the sigmoid. The sigmoid is divided in a healthy area, and its distal end is turned in. The diseased proximal segment is brought out at the upper end of the operative wound as a colostomy. This permits the fecal stream to be sidetracked through entirely normal tissue and the infected contents of the involved colon to be discharged out of the body. Following a period during which the patient is permitted to build up his strength, a second operation is done, at which time the diseased colon is removed entirely. Occasionally the latter operation has to be done in two stages (Fig. 4).

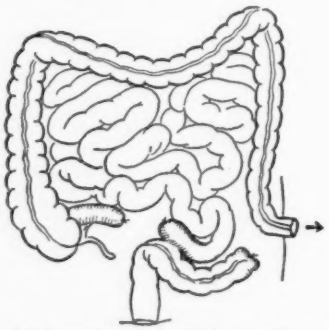

Fig. 2. Implantation of proximal end of ileum into the lower sigmoid. Complete division of two upper ends of sigmoid. Closure of the distal end of sigmoid. Establishment of artificial anus in proximal end of sigmoid.

As performed, the operation offers these advantages: (1) there is absence of shock; (2) the suture lines are guarded against infection since the infected contents are discharged outside; (3) extirpation of the colon is made possible even in debilitated individuals; and (4) the continuity of the alimentary tract is maintained without a permanent stoma in the nature either of an ileostomy or of a colostomy.

JOHN WILTSIE EPTON, M.D.

A Discussion of the Diagnosis and Treatment of Cancer of the Colon (Umfrage ueber die Diagnose und Behandlung des Dickdarmkrebses). *Med. Klin.*, 1937, 1: 437, 468, 500.

As Petermann indicated in his introductory remarks the purpose of this discussion was to improve the results of operation for cancer of the colon by clarifying certain essential matters. These concern: (1) the early symptoms; (2) the value of roentgen examination for early diagnosis; (3) the particularities of surgical procedures; and (4) the management of inoperable carcinoma.

The first question was unanimously answered to the effect that definite early symptoms may not be apparent even to the intelligent and watchful patient if there is no bowel constriction or bleeding (Stich). Discomfort in the abdomen and temporary constipation in patients over forty years of age should arouse suspicion of cancer (Fischer). If the stools are altered at a certain definite period, if diarrhea occurs or if distention and colic occur after certain foods, one should not be satisfied with the diagnosis of "spasm" but should look for cancer (Nordmann). Local abdominal distention and occult blood are frequently found in the stool (Wildegans); on the other hand, the sedimentation rate of the red blood corpuscles is no indication as concerns cancer (Stegemann).

Roentgenology of the large bowel has progressed so that we can recognize malignancy very early (Kirschner), especially when we use three procedures: contrast enemas, full distention of the colon, study of the relief of the contracted colon, and study of the connecting intestine distended with air (Fischer). The roentgen examination should go hand in hand with the clinical investigation, and in doubtful cases should be repeated after a while. In spite of all advances in diagnosis, exploratory laparotomy should not be neglected, although its use is progressively becoming restricted (Schmieden).

As concerns the type of operative intervention all experienced surgeons are agreed. Each individual case requires exact study, care, and consideration as concerns the strength of the patient, the advisability of the basic radical operation always being kept in mind. Should there be ileus, we should remember that in such a case there are two ailments present: (1) ileus, (2) cancer. The latter condition cannot be attacked until the former has been cured (Schmieden). According to the situation of the cancer in these

cases an artificial fistula in the small intestine or an artificial anus in the colon is made; then a second operation is done for the cancer. The safeguard of a fistula must also be resorted to when the intestine empties incompletely or when the condition of the patient necessitates small operative procedures. In uncomplicated readily movable tumors in accessible situations it is advisable, in general, to do a one-stage operation in which the side-to-side or the end-to-side anastomosis is used to unite the bowels. In the multiple-stage operation the exteriorisation of the diseased bowel is practiced.

In the treatment of inoperable cancer of the colon entero-anastomosis and artificial anus are of service. The anastomosis is more pleasant for the patient, serves the same purpose as the artificial anus, and is to be preferred, whenever it is technically possible. Nordmann also recommends that the lowest end of the small intestine be implanted caudal to the tumor in order to give complete rest to the cancer area and inhibit its growth. Radiation therapy is discouraged by all authors. It is not only useless and expensive, but it even induces a rapid decline. Schmieden goes so far as to state that roentgen irradiation of alveolar adenocarcinoma, which is refractory to irradiation, is malpractice, if through this cause the correct time for operation is missed.

(Henningsen). Jacob E. Klein, M.D.

Finsterer, H.: The Clinical Aspects and Therapy of Carcinoma of the Large Bowel (Zur Klinik und Therapie des Dickdarmkrebses). *Wien. klin. Wchnschr.*, 1937, 2: 1019, 1059.

The author is able to confirm the assertion made by Mickulicz, that carcinoma of the large bowel is relatively benign. For this reason an effort to further reduce the operative mortality is completely justified. Two hundred and twenty-six cases operated on by the author himself were studied for their results. The desire for early operation was not fulfilled; 24.8 per cent of the patients had already developed acute intestinal obstruction, and the remainder had had complaints on the average of about ten months' duration. For the early recognition of the condition the most important thing is to think of the possibility of carcinoma and not to allow oneself to be steered into false conclusions by isolated symptoms of the disease that may make their appearance at the beginning. One of these symptoms is the painful inflation of the cecum and ascending colon, which even in carcinoma of the left half of the large intestine not infrequently may lead to a mistaken diagnosis of appendicitis. The appearance of chronic constipation should be suspected as a sign of carcinoma in every person over forty years of age. Also the colic-like pains which in many instances are most predominant in the right half of the abdomen do not always signify appendicitis. A palpable tumor is to be regarded as a late finding. As soon as the suspicion of a carcinoma arises the practitioner must make the diagnosis certain by all the clinical methods of examination which are at his disposal. In addition to rectosigmoidoscopy and the barium enema including the film of the emptied bowel, the contrast meal is also indicated. One must guard against the misdiagnosis of "spasm." The latter is present only if the constriction in question disappears upon the administration of atropine. A negative x-ray finding should not quiet all suspicion. If the diagnosis still remains uncertain then an exploratory laporotomy is indicated.

The contra-indications for radical operation should not be carried too far: the extension of the carcinoma to the small intestine or its mesenterium should not without further complications be a contra-indication to radical operation. Furthermore, there is only a slightly higher operative mortality in patients over sixty years. In view of these considerations the author sets the operability in his cases as wide as 79 per cent.

The operative procedures were divided as follows: 179 (79.2 per cent) were resections, 30 (13.2 per cent) colostomies, and 17 (7.5 per cent) entero-anastomoses. The immediate mortality following operation depends primarily upon the condition of the patient. The highest mortality, 30.2 per cent, occurred in the cases presenting acute intestinal obstruction which could be treated only by cecostomy at first. Since this procedure was carried out primarily under local anesthesia, the very low mortality of 8.3 per cent explains itself. The intestinal resection which was performed after complete emptying of the bowel was later modified with a closing of the ventral anus, so that a three-stage resection was evolved which yielded a mortality of 13 per cent. It is only in intestinal obstruction caused by carcinoma of the right half of the large intestines that the typical marsupialization of the carcinoma is recommended. If there is no acute obstruction then it is possible to carry out, other circumstances permitting, a one-stage operation in carcinoma on the right side, but in carcinoma on the left side it is practically always necessary to perform the two-stage resection, in which the side-to-side anastomosis is almost exclusively employed. The one-stage resection gave a mortality of 15.3 per cent; the two-stage resection gave a mortality of 26 per cent in carcinoma of the right half of the large bowel, and a mortality of 30 per cent in carcinoma involving the left portion of the large bowel.

In stenosing carcinoma the three-stage resection, giving a mortality of 23.3 per cent, is the method of choice. In this respect only 3 of the 7 deaths were directly related to the method of operation used. The entire series of three-stage resections in cases with and without intestinal obstruction showed a total mortality of 18.8 per cent. In general the local anesthesia was of the most significance in explaining this result, as it prevents intestinal atony and pulmonary complications, permits older individuals to be subjected to operation, and allows more time for the performance of the operation. General anesthesia makes rapid operation necessary and thus tends to limit the extent of the procedure. The evaluation of the end-results is based upon 96 cases operated upon

at least five years previously and in which the diagnosis was substantiated histologically. Of all of the patients in whom resection was done 43.7 per cent, or 57.8 per cent of those discharged as cured, remained free from recurrence for more than five years. Fifty-one and three-tenths per cent of the patients with carcinoma on the right side and 38.9 per cent of those with carcinoma on the left side were cured.

(DRUEGG). HARRY A. SALZMANN, M.D.

Wangensteen, O. H., Buirge, R. E., Dennis, C., and Ritchie, W. P.: The Etiology of Acute Appendicitis. *Ann. Surg.*, 1937, 106: 910.

The observations made during the nineteenth century stressed mechanical disturbances as the cause of inflammation of the vermiform appendix. Convincing evidence, however, was lacking to establish mechanical disturbances as the chief cause of appendiceal suppurations. Speculation and armchair philosophizing have given us many different theories relative to the origin of this disease; and complete sight was lost of the pathological observations of our medical ancestors. The vigorous declarations of Aschoff, who believes that acute suppurative appendicitis is essentially a specific disease due to the enterococcus Type B (Gundel), have won many converts to the view that appendicitis is infectious in origin. However, many observations relative to the importance of the obstructive factor cannot be lightly dismissed or set aside.

The present study was undertaken with the purpose of investigating the minute anatomy of the vermiform appendix of man, to determine whether the obstructive features of acute suppurative appendicitis found an accordant explanation in the behavior of this appendage. An attempt was also made to evaluate the likely significance of the factors of infection and obstruction. It has been pointed out that in the severe forms of the disease in man, perforative and gangrenous appendicitis, a demonstrable obstruction, often a fecalith, was usually present.

Evidence of fluid secretion by the vermiform appendix was obtained. The nature of this secretion still remains obscure. Its amount in the normal appendix is from 1 to 2 c.cm. daily. The luminal capacity of the vermiform appendix was found to be very small, and it is intimately related to the problem of fluid secretion under conditions of obstruction of the lumen.

The vermiform appendix of man serves no known useful function. It apparently possesses the function of secreting a minimal amount of fluid. Because of this function of secretion, the appendix becomes a dangerous organ when obstructed. The minute anatomy of the vermiform appendix as it relates to the problem of acute appendicitis has been studied extensively. The resistance to luminal outflow which the appendix exhibits is in all likelihood a result of its small luminal capacity and strong sphincter-like circular muscle. No evidence of a true cecoappendicular sphincter has been found.

The effect of obstruction of the cecal appendix has been studied in many animals. Only in the rabbit's appendix has a secretory function been observed comparable to that shown in the vermiform appendix of man. JOHN W. NUZUM, M.D.

Nassau, C. F.: Treatment of the Ruptured Appendix. *Surg. Clin. North Am.*, 1937, 17: 1743.

Appendicitis constitutes the most common infective lesion within the abdomen and naturally demands first consideration in diagnosis. In the fulminating types, perforation may occur within six hours of the onset of symptoms. It is well known that the mortality of this disease is not decreasing in the United States. This is the result of the physician's failure to make an early diagnosis or his being called too late. It is an incontrovertible fact that those patients who are taking a cathartic or who have had one prescribed for them are the ones in whom perforation occurs more rapidly and frequently with fatal results. A perforation occurring naturally is always a far better operative risk than one in which the bowel contents are in a fluid state and where active peristalsis exists as the result of purgation.

While it is generally agreed that all early cases demand immediate operation, controversy still exists as to whether immediate operation should be performed in the patients with perforation of several days' standing or whether the Ochsner conservative therapy should be carried out. There is a small group of patients in whom delay in operation is the wiser and safer course of procedure. In these the Ochsner treatment effects localization of the infection and the abscess can be safely drained at a later date. In a recent survey in one hospital, localization occurred in the pelvis under this treatment in 18 cases; incision and drainage by the rectum resulted in 17 recoveries and 1 death.

The McBurney incision is preferred by the writer because the muscles are split in the direction of their fibers; there need be no division of the nerve supply; there is less exposure of the intestines; exposure is frequently directly over the appendix; the deep epigastric vessels are rarely encountered; drainage is lateral to the small bowel; and the incidence of postoperative hernia is much lessened. From an anatomical standpoint, the McBurney incision has much to recommend it.

At operation, the appendix should always be removed if possible and if it is safe to do so. When the appendix forms part of the abscess wall, it must be accurately determined whether it can be safely removed without breaking into the clean peritoneal cavity. Few operations demand more skill and judgment than the removal of a violently infected, adherent appendix. If there is much infection, simple ligation of the base of the appendix will suffice. The use of the cautery or carbolic acid is not vital. Purse-string or other occluding sutures are unnecessary. In a thickened and inflamed cecum, they may be harmful and cause sloughing. The wound is to be

left completely open in all badly infected cases, no sutures whatever being used.

The most important factor about drainage is the accurate placing of the drains. The dressed drainage tube should be introduced first by sliding it on the end of a long forceps along the pelvic wall to the bottom of the pelvis. The cecum can usually be placed so that the appendix stump rests against the lateral wall, removed from actual contact with the drains. The dressed drains consist of gauze rolled in a Penrose rubber tubing. After the Penrose drainage has been placed, plain or iodoform gauze is used to keep the wound open and the tube in place. Since the wound is not sutured, this is the only method known to keep the bowel from eviscerating and at the same time allow free drainage.

Postoperative treatment consists of the administration of morphine in sufficient amounts to keep the patient comfortable. Liquids by mouth are withheld until the tone of the bowel is restored. Wangensteen syphon drainage is employed for gastric distention. The patient should receive an average of from 2,500 to 3,000 c.cm. of fluid daily if there is no abnormal loss of chlorides and fluids from vomiting. The amount of chlorides required to maintain the electrolyte balance can be accurately gauged by estimation of the blood chlorides and the alkali reserve, from 5 to 6 gm. being necessary each day. Continuous intravenous infusion with 2 per cent glucose in normal salt solution is the preferred method. Introduced slowly, it will not overburden even the damaged heart. When hypodermoclysis is employed, it should not be given in the thighs. It is a needlessly painful procedure as there is no room for the fluid because of the lack of loose cellular tissue in the thighs. It should be given under the axillæ or at a point about 6 in. below in the midline where absorption is rapid. In septic patients, small transfusions of whole blood are most valuable. The dressed drain is completely removed on the fifth or sixth postoperative day and is immediately replaced by a gauze wick. The patient is allowed to be up when the drainage wound is reduced to the size of a small lead pencil. JOHN W. NUZUM, M.D.

Keyes, E. L.: Squamous-Cell Carcinoma of the Lower Rectum. *Ann. Surg.*, 1937, 106: 1046.

The author gives a detailed account of 27 proved cases of squamous-cell carcinoma of the lower rectum and anus. A series of adenocarcinomas was also observed in detail for the sake of comparative study. From his observations the author arrived at some very interesting conclusions.

Squamous-cell carcinoma of the lower rectum and anus is not rare. It occurs more frequently among females than among males. Some factor preponderant in the female sex seems to be responsible for the condition.

A chronic irritant factor in most cases is concomitant with the origin of the carcinoma. This local irritation was observed in various forms. Hemorrhoids or condylomas were present in 7 instances; anal fistula or abscess was noted in 5, leucorrhea in 3, and unusual trauma to the anus in 2 cases. In 1 case the condition developed in an area of perianal leucoplakia seven years after operative treatment and the apparent cure of a vulvar carcinoma. Another case of anal carcinoma arose in a perianal scar resulting from the treatment of a vulvar carcinoma which had apparently been cured four years previously by means of radium application. The author observes that areas of leucoplakia about the anus are to be regarded with suspicion, if not removed. Moreover, radiation of the perineum must always be administered with care lest it predispose to carcinoma of the anus. So important is this matter of local irritation that the disease may sometimes prove to be preventable. Thus adequate treatment of anal disease and of certain cervical or vaginal diseases may remove a chronic irritant factor, which, if allowed to continue, might serve as a predisposing cause to a carcinoma in the anus.

Pain seems to be an early and frequent symptom of the disease. The carcinoma itself is probably not directly responsible for the pain, but possibly fissure of the anal mucosa or an associated infection may be the cause. Other early symptoms are pruritus and bleeding. Some patients feel an unusual mass in the anus. Pus and pain on defecation are likewise fairly common. Occasionally a change in bowel habit is noted, with either constipation or diarrhea or with both alternating. Sometimes ribbon or pencil stools are passed, and again other stools contain blood or pus. In the later stages the frequency or urgency of urination is noted. Other symptoms are incontinence of feces, perirectal abscess, and anal fistula. Some patients lose weight, while others may note a mass in the groin. This symptomatology is, however, not characteristic of the squamous-cell type of carcinoma only. Similar symptoms were noted in the cases of adenocarcinoma of the anus.

As to physical characteristics, all the carcinomas in the author's series were readily accessible by palpation. Some of them were visible from the outside. A number of them were externally located while others were situated internally; some of them ran high into the rectum, the highest tumor being about 8 cm. above the anal orifice. Only one tumor was annular. In this respect squamous-cell carcinoma did not resemble adenocarcinoma, which frequently encircles the anal canal in annular fashion. The characteristic appearance of carcinoma was rarely lacking upon inspection or palpation of any of the tumors. In most cases biopsy was employed to confirm the diagnosis. Without it, adenocarcinoma could not be ruled out.

A study of the character of the metastatic spread of squamous-cell carcinoma of the lower rectum and anus brought out the significant fact that the general direction of metastatic extension was downward and lateral, but not upward. This was in contrast to the general direction of metastatic extension of adenocarcinoma, which was upward rather than downward and lateral. This circumstance has an

important bearing upon the operative treatment of squamous-cell carcinoma. The theory that metastases from squamous-cell carcinoma of the lower rectum and anus are usually rather well circumscribed and rarely distant has not previously been clearly set forth. The failure of squamous-cell carcinoma of the lower rectum and anus to invade the upward zone of Miles would make less radical excision possible.

With regard to treatment of the primary tumor in the case of squamous-cell carcinoma a choice between surgery and irradiation is possible, since some of the primary tumors of this type are radiosensitive. Tumors of the adenocarcinoma type are known to be radioresistant.

Regarding operation, the author advances certain principles as a result of his study. He deems it essential that the primary tumor be widely excised, with removal of the sphincter and radical excision of the anus and rectum. In addition, a maximum of the tissues in the downward and lateral zones of Miles should be removed. This would include a wide amount of perianal skin, the sphincter ani muscles, the ischiorectal fat together with the coccygei and levator ani muscles, and the pelvic fascia and pelvic peritoneum laterally to the pelvic walls. As to upward dissection, the optimal height for amputation of the rectum would seem to be a moderate distance above the reflection of the peritoneum upon the rectum. A bilateral dissection of the inguinal and femoral lymph nodes seems absolutely justifiable in every case of squamous-cell carcinoma of the lower rectum and anus, principally as a prophylactic measure. It is true that squamous-cell carcinoma is not likely to metastasize to the groin in every case; however, when it does it almost always proves fatal.

MATHIAS J. SEIFERT, M.D.

Thorgersen, E.: On Fistula Ani, and Its Treatment, Taking into Consideration Fistula Ischio Rectalis in Particular. *Acta chirurg. Scand.*, 1937, 80: 113.

The correct treatment of fistula ani demands an accurate diagnosis of the fistula. An intimate knowledge of the course, extension, cause, and pathogenesis of the fistula is required. The most important symptom is secretion, and the pus is usually thin and liquid in the chronic stage. The patient may have pain followed by a copious discharge of thick pus. The discharge may disappear and the external orifice close for a time. In complete fistula, fecal material and flatus may pass through the tract. From a diagnostic angle, it is most important to decide whether the fistula is complete or incomplete and whether it is intrasphincteral or extrasphincteral in location. As regards the causes of fistula ani, chronic constipation occupies first place. The fistula always develops from an anal abscess. There is a marked tendency toward a chronic course due to the constant re-infection from the bowel. Tuberculosis is also responsible for a certain number of fistulas of the rectum.

The treatment of ischiorectal fistula is carefully discussed. It is evident that both division and excision after division are dangerous, the anal sphincter often becoming incontinent even though the methods are modified in various ways to offset this danger. Operations which aim at closure of the external fistulous opening to make it proof against infection and in which the fistula is more or less excised are not very practicable. The writer believes the most efficacious treatment is that in which the mucous membrane of the rectum is stitched down into the anal ring, so that the internal fistulous opening is covered by healthy mucous membrane. Wideroe's modification, which leaves the fistulous tract untouched, is particularly applicable. The writer has records of 18 cases of fistula operated upon according to the Wideroe method and which upon reëxamination showed that all of the 18 patients were permanently cured. The Wideroe method is recommended highly.

JOHN W. NUZUM, M.D

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Huggins, C., and Post, J.: Experimental Subtotal Ligation of the Arteries Supplying the Liver. *Arch. Surg.*, 1937, 35: 878.

The authors report the results of two series of experiments, showing the difference between acute ligation of the main arterial supply of the liver and subtotal ligation of the hepatic arterial supply in multiple stages. In these experiments they followed the postulates of Haberer: (1) the point of ligation shall be accurately stated, (2) the experiment shall be terminated by the injection of the arteries to establish the collateral circulation, and (3) the operation shall be done under aseptic technique.

In 9 dogs the hepatic artery and its principal collaterals, the right gastric and the gastroduodenal arteries, were sectioned between ligatures. All of the dogs died of peritonitis, and in nearly all of them bloody fluid was found in the peritoneal and pleural cavities in association with the liver necrosis. In a second series of dogs, the hepatic artery was ligated proximal to its communication to the gastroduodenal artery. After a period of from one to four weeks, the gastroduodenal and the right gastric arteries were ligated, and the hepatic artery was dissected and excised, and its branches were ligated where they entered the liver. About 2 cm. of the cystic artery were removed with the entire hepatic artery, and 2 cm. of each of its branches to the liver. In 3 dogs the peritoneal attachments of the liver to the diaphragm, esophagus, stomach, and posterior abdominal wall, as well as the adventitia of the hepatic veins were removed at the third stage, and in 2 of these the phrenic arteries were also ligated. None of the dogs in the second series died; however, acute cholecystitis occurred in all.

The authors believe that it is impossible to completely deprive the liver of its entire arterial supply in this manner, as fine arterioles are demonstrable

by injection following up the portal vein and common bile duct. Apparently, if the arterial circulation of the liver is gradually reduced, death from anaerobic bacteria does not occur, and the liver becomes accommodated to the deprivation of most of its arterial supply. WILLIAM C. BECK, M.D.

Garlock, J. H., and Klein, S. H.: The So-Called Hepatorenal Syndrome. *Ann. Surg.*, 1938, 107: 82.

The authors discuss the various clinical and pathological aspects of the so-called hepatorenal syndrome occurring after operations upon the gall bladder and biliary ducts, as reported in the literature. Many of the reports were found to be wanting in post-mortem studies. Those that include necropsy examinations present a curious lack of uniformity of the pathological picture, which raises the question of why one case presents minimal findings at autopsy, while another with the identical clinical picture may exhibit extensive hepatic and renal degenerative changes.

A possible explanation for this considerable variation in degree and extent of the pathological findings is suggested. It seems possible that many of the patients have some degree of kidney damage before the surgical attack on the biliary system, with a small margin of safety from the standpoint of renal reserve. This impairment may not be apparent or demonstrable by any known laboratory methods. Following the operation upon the diseased biliary tract, with its associated surgical trauma and the greatly altered physiology that must necessarily follow, the already impaired kidneys are unable to cope with the additional load thrown upon them and soon break down completely. The clinical picture, with the relatively free interval of five to ten days after operation, suggests confirmation of this thought.

A case is reported in detail in which, five days after operation for a calculous gall bladder and bile-duct disease, there followed a clinical course characterized by progressive asthenia and uremia with terminal icterus. Death occurred on the thirteenth postoperative day. The post-mortem findings, in contrast to the severe liver and kidney changes reported in the literature, consisted only of mild parenchymatous degeneration in these organs, and acute and chronic cholangitis. These changes certainly could not be held responsible for the clinical course of the patient. The kidneys, however, showed some focal interstitial inflammation, manifested by nests of lymphocytes, plasma cells, and infrequent polymorphonuclear leucocytes within the stroma of the medulla. In addition, there was a striking glomerular lesion. This consisted of an increase in the size of the glomeruli, which was due to prominence of the intercapillary connective-tissue framework which appeared spongy, as if distended by fluid. There was no increase in the cellularity of the malpighian corpuscles. This glomerular picture bore a strong resemblance to the acute intercapillary glomerulonephritis described by MacCallum and considered by him to constitute the initial stage of the chronic condition known as glomerulonephritis.

In conclusion, the authors have formed the opinion that no logical or satisfactory explanation of the so-called hepatorenal syndrome has as yet been offered. Although many authors believe it to follow surgery of the biliary tract only, the same syndrome has been known to follow operations upon the gastro-intestinal tract and also extensive cutaneous burns, conditions known to be closely linked with disturbances of the protein metabolism.

Livraga, P.: Hepatic Autolysis *in Vivo*. Contribution to the Knowledge of the Hepatorenal Syndrome (L'autolisi epatica in vivo. Contributo alla conoscenza della sindrome epato-renale). *Clin. chir.*, 1937, 13: 817.

Livraga believes that during the autolytic disintegration of tissues there are formed substances which are capable of producing grave symptoms in the organism and even death. Examples of this phenomenon are furnished by the symptoms which follow extensive burns, severe surgical traumatism (a condition generally called "shock"), and unilateral ligation of the ureter due to the formation of nephrotoxins which escape into the circulation.

Fiessinger and his collaborators used hepatic autolysates and extracts which, when injected into animals, produced anatomical and functional alterations of the liver and also some slight changes in the kidneys. It has been also reported that the most potent preparations of this kind were those which had been kept in the thermostat under toluene for a period of from eighteen to forty-four hours. The maximum effect was obtained with autolysates thirty-six hours old at a pH ranging between 7.65 and 8.30.

Histological examination of the liver revealed a diminished glycogenolytic action of the cells and the presence of degenerative changes throughout the organ. Similar histological findings have been found in analogous experiments performed with renal autolysates.

Livraga studied this problem in dogs by removing small portions of liver tissue and transplanting them into the abdominal cavity, where they underwent autolysis. In his experiments the author used exclusively dogs which were in excellent physical condition. A portion of the liver was removed and small pieces of the removed tissue were secured for microscopic examination, for the determination of the iodine number, and for bacteriological examination. All the dogs were examined after death and all showed a serous peritonitis characterized by the presence of variable quantities of fluid within the abdominal cavity, and a few fibrinous strings.

The visceral peritoneum was hyperemic and presented subserous hemorrhages in various places. There was marked meteorism in all of the dogs.

Macroscopically, the liver was intensely congested and 1 dog showed an exudative pleurisy in the left thorax.

The histological findings of the liver and kidney included a marked hyperemia with extensive and diffuse intraparenchymal hemorrhages, venous congestion, edema, and small-cell infiltration of the vascular adventitia.

Further changes included cloudy swelling and vacuolar degeneration of the cells.

In the kidney there was a diffuse hyperemia involving especially the arcuate vessels, the glomeruli, and the capillaries of the medullary zone. A few infratubular hemorrhages were observed.

All the animals died within from twenty-four to forty-eight hours, as the result of the morbid changes produced by the pieces of liver tissue transplanted into the peritoneal cavity which were undergoing autolysis. The weight of these implants ranged from 30 to 40 gm. If the weight of the transplanted tissue was reduced to 10 gm. the animal survived from three to four days and the liver showed changes typical of an acute yellow atrophy.

The author concludes by stating that pieces of liver tissue transplanted into the abdomen undergo rapid and massive autolysis. During this process highly toxic substances are liberated which when absorbed, produce vascular lesions and necrotic degenerative changes in the liver similar to those of acute yellow atrophy.

The hepatic condition is usually associated with a renal condition which may be so severe as to cause death of the animal.

Clinically, this is of considerable importance because in surgical patients presenting an obstruction of the biliary tract it is more advisable to remove seriously damaged portions of the liver tissue rather than to proceed conservatively.

RICHARD E. SOMMA, M.D.

Bettman, R. B., and Lichtenstein, G.: End-Results Following Cholecystectomy. *Am. J. M. Sc.*, 1937, 194: 788.

The authors present an analysis of the results following cholecystectomy performed upon 239 patients on the charity service at Michael Reese Hospital. Despite careful pre-operative study and judicious selection of the cases they found that a disappointingly large group of patients have had little or no relief from the symptoms for which the operation was performed.

Of the 239 patients 208 were females and 31 were males. About 63 per cent of them were between thirty-one and fifty years of age. Epigastric and right upper quadrant pain was the most common symptom in both the calculous and non-calculous types of disturbance. Nausea, vomiting, belching, food idiosyncrasy, and bloating occurred in the order given. There was a history of jaundice in 27 per cent of the patients, in both those with and without stone. The possibility of stones having passed into the duodenum at some time previous to operation was suggested. A cholecystostomy had been performed upon 17 of the patients.

Some type of operation on the common duct was carried out in 33 cases. The mortality in the series was 4.2 per cent. The mortality in those cases in which an exploration of the common duct had been made was 12.1 per cent, while simple cholecystectomy carried a mortality of 2.9 per cent.

The authors classify their results in 184 patients who had been followed up from one to six years according to: (1) symptomatic cure, (2) symptomatic relief, and (3) no relief. From a pathological standpoint the cases have been divided into five groups as follows:

1. Those with no demonstrable gross or microscopic lesions of the gall bladder
2. Those presenting fibrosis
3. Cases of chronic cholecystitis
4. Cases of marked chronic cholecystitis
5. Cases of acute cholecystitis

It was observed that the percentage of good results increased with the severity of the lesions encountered in the gall bladder, and in general the shorter the duration of the symptoms the greater the benefit. The poorest results were encountered in the age groups from eleven to twenty and from fifty-one to seventy. A follow-up study was made of 119 patients who had stones; 82 per cent were cured or benefited by the operation. Of the 58 patients without stones only 67 per cent were benefited.

JOHN A. GIUS, M.D.

GYNECOLOGY

UTERUS

Lipschuetz, A.: Experimental Hyperplasia of the Endometrium with Atypical Proliferation of the Uterine Mucosa following Ovarian Interventions (Hyperplasie expérimentale de l'endomètre avec prolifération atypique de l'épithèle utérin après des interventions ovariennes). *Gynéc. et obst.*, 1937, 36: 408.

Lipschuetz states that the female sexual cycle depends primarily upon adequate follicular function in the ovary. The cycle is a complex one and other organs also, such as the anterior lobe of the pituitary gland and the central nervous system, participate in its mechanism. The placenta and the breasts exert a contributory influence during pregnancy and the puerperium.

The author is primarily interested in the reactions ensuing from the removal of one ovary and subtotal resection of the other one. He found that following this operation, the surviving ovarian fragment undergoes hypertrophy and the number of graafian follicles steadily decreases until the entire supply is used up. He believes that an extragonadal factor "X" exists, which factor regulates and controls follicular development quantitatively as well as chronologically. This suggestion has been offered also by other investigators.

Lipschuetz has found also that following the aforementioned operation, the growing follicles become cystic and, in the cat and guinea pig, the tissue surrounding the cystic follicle becomes luteinized. This is sometimes associated with an intrafollicular hemorrhage. According to the author these changes are due primarily to disturbances in the relationship between the anterior lobe of the pituitary gland and the ovary, arising as the result of the ovarian intervention.

Other disturbances are also observed. In the rat the keratinization of the vaginal epithelium, characteristic for estrus, persists for several weeks and months. The introitus of the vagina gradually opens and the vagina itself is filled with a grayish and viscous secretion. The mammary gland becomes hypertrophied as in the last days of pregnancy. Colostrum may be expressed in some cases.

The most drastic changes, however, are observed in the uterus. The microscopic picture of the uterine mucosa corresponds to that seen in glandular cystic hyperplasia in the human female.

The proliferation of the uterine glands is remarkable. The entire mucosa is filled with glandular cavities of various diameters. Some of them are veritable cysts. The endometrium is usually hypertrophied and the large cysts are filled with desquamated cellular elements and many leucocytes. The layer in which the uterine glands proliferate is greatly thickened and edematous, and presents many dilated blood vessels, some of which are ruptured. Extravasations are common. The uterine cavity is almost always dilated and may contain some leucocytes and red blood cells.

The microscopic picture is typically that of a cystic hyperplasia of the endometrium due to the persistence of graafian follicles in the ovarian fragment. It has been shown experimentally that cystic glandular changes of the endometrium may be produced by the administration of estrone, which is normally elaborated by the growing graafian follicle and which stimulates the growth of the endometrium.

The author concludes that the endometrial changes in animals with an ovarian fragment are due primarily to a prolonged follicular phase of the ovarian cycle. RICHARD E. SOMMA, M.D.

Lehmann, P., and Marquès, P.: Treatment of Cancer of the Cervix by Radiotherapy, X-ray, Radium, and Electrocoagulation (Traitement du cancer du col par la radiothérapie, rayons X et radium et l'électrocoagulation). *Rev. franç. de gynéc. et d'obst.*, 1937, 32: 763.

In the treatment of cancer of the cervix, the utilization of physical agents previously reserved for inoperable cases is steadily becoming the treatment of choice.

The authors divide their treatise into a detailed discussion of the technique, the statistical results, and the therapeutic indications for x-ray, radium, and electrocoagulation.

The biological effect of radiation upon the cells varies with the dosage; massive doses produce coagulation by necrosis and the degree of this caustic action is dependent upon penetration and absorption. With smaller doses the effect varies from cytolysis, pycnosis, and caryorrhexis to abortion of cell division or temporary arrest of growth.

Cancer of the cervix is the most radiosensitive carcinoma of the body and its readily accessible location makes it particularly suitable for all types of radiation. In these carcinomas of the cervix the ultimate aim is to destroy the local lesion, and the intracavitary application of radium is the ideal method of treatment. For extension into the ganglia and metastases roentgenotherapy is indispensable.

The most important radiotherapeutic problem is to obtain maximum depth with one surface dose. It is the physical study of the distribution of these radiations which will aid in establishing a solution to this problem, and this distribution is dependent upon two factors: a divergence factor and an absorption factor. The factor of divergence is the geometrical consideration in irradiating a surface that the intensity varies inversely with the distance and in direct ratio with the cosine of the angle of incidence. The factor of absorption is regulated by means of diffusion or by fluorescence.

This physical study of the distribution of energy in the process of irradiation demonstrates that in order to get the maximum yield at a depth, it is necessary to (a) utilize a short length filtered wave, (b) augment the width of the irradiated area, (c) increase the distance from the skin, and (d) utilize crossed rays.

The technique for utilizing the curietherapy as practiced in France consists essentially of making one properly screened uterovaginal application, the dose equalling 60 destroying millicuries. Before the radium is to be applied the patient is prepared by vaccinotherapy and disinfection of the vaginal canal by suitable antiseptics, followed by dilatation of the cervix with Hegar dilators, and if the patient remains afebrile for twenty-four hours the radium is placed *in situ* and proper tamponade effected. Each day the radium and tampon are removed, the vagina is cleansed and the tampon reapplied. This procedure is continued for a total of from five to five and one-half days. Marked thermal reactions necessitate interruption of the irradiation.

Local roentgenotherapy by means of a specially constructed instrument which can be applied vaginally has recently been introduced, but the authors believe that this method is not as effective as radium. Regional roentgenotherapy consists of irradiating through the skin all regions suspected of neoplastic invasion. The voltage should be high, 200,000; the filtration should be sufficient to permit of a homogeneous application, 2 mm. of copper in France, with a secondary filtration with aluminum; the distance should be 80 cm. from the anticathode to the skin.

One of three methods of treatment by means of the roentgen-ray are commonly employed, the successive series method, consisting of small doses at from two and one-half to three-month intervals; the fractional series method, extending over a period of thirty days, beginning with from 100 to 125 roentgens and increasing daily; or the rapid method, with a large dose at one exposure. A fourth method known as total roentgenotherapy is employed in those cases in which the carcinoma is generalized. The dosage should be small, from 25 to 50 roentgens in graduated doses not to exceed from 300 to 350 roentgens per any one series.

Electrocoagulation or diathermy coagulation produces destruction by coagulation and is not a selective action upon the cancer cells *per se*.

The diverse methods of treating cancer of the cervix can be combined, and the combination of roentgenotherapy and curietherapy becomes the method of choice, roentgenotherapy for the parametrium and curietherapy for intracavitary use.

The statistical results of the treatment of cancer of the cervix by radiation have improved considerably in the last fifteen years.

Histologically one encounters the following changes in the irradiated cells: (a) destruction by pycnosis, then a rapid absorption; (b) atypical kinesis with new plurilobe formations and cells of large dimensions which degenerate rapidly and become absorbed, and (c) a state of amitosis which is pronounced about the tumor. In the tumor proper, there is (a) a destruction followed by a rapid absorption of the tumor cells, (b) an evolution towards keratinization of the intermediate cells, and (c) a capillary congestion with diapedesis, and edema and appearance of the mobile cells of the adjoining tissues destined to liquefy the residues.

Anatomically the tumor diminishes, then disappears in conjunction with the process of absorption.

In these studies the percentage of cures of cancer of the cervix from the diverse statistics is very encouraging. Radiation, formerly reserved for those cases in which surgery was contra-indicated, is now becoming the method of choice in the treatment of carcinoma of the cervix. GEORGE C. FINOLA, M.D.

Novak, E., and Anderson, D. F.: Sarcoma of the Uterus. *Am. J. Obst. & Gynec.*, 1937, 34: 740.

This study is based upon 59 cases of uterine sarcoma observed during a twenty-five-year period, in a total material of 26,972 case specimens, an incidence of 0.22 per cent. The highest age incidence was noted in the fifth decade of life. The symptomatology is not distinctive, and diagnosis is often difficult until operation and laboratory examination.

Sarcoma may arise from any of the constituent elements of the uterine wall or of uterine myoma, but is commonly of myogenic origin. It is probable, however, that it cannot arise, as was formerly believed, from mature muscle fibers, in spite of the apparent histological transitions often seen. As with sarcoma elsewhere, its origin is almost certainly from unripe or undifferentiated muscle-cell elements. The most common seat of origin is in myomas, the incidence of such change in the authors' series being 0.56 per cent and representing a fair estimate. The most serviceable grouping is along general pathological lines, into round, spindle, mixed, and perhaps giant-cell types. The degree of mitotic activity is a good index of the degree of malignancy of these tumors.

The treatment is often a matter of expediency rather than deliberate planning, especially as the disease is so often recognized only at or after operation. Surgery is therefore the basic method of treatment, with radiotherapy as a valuable adjunct.

While uterine sarcoma is a serious disease, the outlook is relatively good when the tumor arises in a myoma. The mural and endometrial varieties of tumor are more unfavorable.

A follow-up study was possible of 50 patients. Of these only 15 (30 per cent) were known to be living at the end of five years, and only 12 (24 per cent) at the end of ten years. EDWARD L. CORNELL, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Hamblen, E. C., and Ross, R. A.: Responses of the Human Ovary to Gonadotropic Principles. *Endocrinology*, 1937, 21: 722.

The authors feel that ovarian responses judged either by direct observations at laparotomy, by

microscopic study, or by inferential studies of the endometrium were not different qualitatively or quantitatively in their series of patients receiving larger daily and larger total dosage from those in patients reported previously. No progestational reaction occurred after treatment in the endometriums of the 6 patients with presumed anovulatory failure. Such observations have been taken as evidence that ovulation and corpus-luteum formation had not occurred in these ovaries. In 2 of these patients such inferences were confirmed by direct observation of the ovaries.

Hamblen and Ross are cognizant of the errors inherent in a diagnosis of anovulatory failure. They believe, however, that the employment of the methods of endometrial interpretation described previously by one of them permits a reasonably safe working clinical diagnosis of such a state. Their inability to observe corpus-luteum formation in the ovaries of patients with anovulatory failure is their strongest evidence of the ineffectiveness of such therapy. It may well be, however, that such ovaries may be unable to respond to such principles because of the mechanical changes occurring in them, thickened tunica and cystic degeneration.

On the basis of the material available in the 85 cases studied to date, including the 7 reported at this time, it seems warranted to assume that if gonadotropic principles are capable of inducing ovulation and corpus-luteum formation in the human, effective pharmacological doses have not yet been given. Such a dose probably is in excess of a daily dose of 8,000 R. U., or of a total dose of 20,000 R. U.

ANTHONY F. SAVA, M.D.

Rhoads, J. E., and Terrell, A. W.: Ovarian Fibroma with Ascites and Hydrothorax. *J. Am. M. Ass.*, 1937, 109: 1684.

A fibroma of the ovary is an uncommon tumor and rarely may be associated with hydrothorax as well as with ascites. The authors note that from the standpoint both of prognosis and of treatment it is important to know of this association of pleural effusion with a benign pelvic tumor. Most pelvic tumors causing pleural effusion are malignant and the effusion is the result of pleural or pulmonary metastasis. In the presence of massive pleural effusion, even after partial aspiration, it may be impossible to exclude the presence of pulmonary metastasis by x-ray examination. In these instances, the occurrence of hydrothorax in association with a pelvic tumor justifies abdominal exploration.

The authors point out that it is only recently that recognition has been made of the syndrome of fluid in the chest in association with ovarian fibroma. In most instances the chief complaints were shortness of breath or discomfort and pain in the chest. In each of 7 cases reported by other workers, the hydrothorax disappeared following removal of the ovarian tumor. A study of a case seen by the authors is reported in detail. A detailed study is also presented of the 9 cases recorded in the literature in which ovarian fibroma had occurred with ascites and hydrothorax.

Although the uniformly good results following removal of the fibroma indicate a causative relationship between the tumor and the ascites and hydrothorax, no satisfactory explanation of the hydrothorax has as yet been suggested.

HERBERT F. THURSTON, M.D.

EXTERNAL GENITALIA

Goodall, J. R., and MacPhail, F. L.: The Surgical Treatment of Cysts of the Vulva and Vagina. *J. Obst. & Gynaec. Brit. Emp.*, 1937, 44: 1097.

The common cysts of the vulva and vagina are due either to deranged function of the normal structures, or to the activity of embryonic rests. In the former group are Bartholin cysts, simple or infected, suburethral cysts, and nabothian cysts. In the second group are the simple vaginal cysts, congenital cysts of the broad ligament extending down the vaginal wall, and cysts from the remnants of Gartner's ducts. The authors believe that the common treatment of excision is disfiguring, sometimes complicated, and often entails an unduly long convalescence. They contend that simple evacuation with destruction, or merely evacuation with fenestration, is preferable.

The authors believe that many of the abscesses of Bartholin's glands are not due to gonococcal infection. The treatment recommended for a Bartholin cyst is the same as that for an abscess. The cyst is opened by a linear incision well out on the vulval surface. The cavity is explored, dried, and cauterized either with the actual cautery or, preferably, by pure carbolic acid carefully applied on cotton swabs, followed by neutralizing alcohol. The cavity is tightly packed with iodoform gauze; this is not removed completely until the eighth day. The patient can usually go home the day after the operation.

Suburethral cysts and abscesses rarely exceed the size of a hen's egg. They originally communicate with the urethra, from which they probably arise. Excision entails the danger of entering the bladder, destroying the urethral sphincter, or producing a urethrovaginal fistula. The authors recommend that a small window be made into the cyst or abscess through the vaginal wall. The vaginal mucosa may be sutured to the lining of the cyst. If pus is present, a gauze wick is left in for a few days. Such treatment results in rapid healing, with permanent closure of the aperture into the urethra.

The perineal inclusion cysts seen at the vaginal outlet in parous women are seldom large enough to cause symptoms. When such cysts cause symptoms, the treatment is excision.

Regarding nabothian cysts, the authors have the following to say: (1) nabothian cysts do not cause symptoms; (2) the visible ones are but a fraction of a general cystic state of the entire cervix; (3) they are merely one expression of a diffuse cervical infection.

If conditions are not such that light cauterization of the surface is indicated, as for catarrhal cervicitis, there is no treatment.

Vaginal cysts are chiefly confined to the upper third of the vagina and are usually simple. The treatment recommended is merely incision of the cyst, cutting out a window appropriate in size to the size of the cyst, and leaving it alone. In two weeks nothing is left. These cysts may often be treated without anesthesia.

DANIEL G. MORTON, M.D.

Cádiz Oyarzun, R.: Primary Cancer of the Vagina. Its Surgical Treatment (Cáncer primitivo de la vagina. Su tratamiento quirúrgico). *Bol. Soc. chilena de obst. y ginec.*, 1937, 2: 328.

Primary epithelioma of the vagina constitutes 2.2 per cent of the genital cancers of the female. The prognosis has been bad because of the silent nature of the condition, frequently remaining asymptomatic for years, allowing the lesion to become well advanced before the patient seeks relief.

Using the classification of Mathey-Cornat, adopted by the Commission for Cancer of the League of Nations, Grade I cancer of the vagina is localized or limited cancer without associated adenopathy; Grade II is cancer with mobile or discrete adenopathy; Grade III is infiltrating or semi-annular cancer with adenopathy; Grade IV is the diffuse carcinoma with invasion of the parametria and adenopathy. The author describes in detail 4 cases of cancer of the vagina observed at the San Augustin Hospital for the past ten years. Each of the 4 cases falls into one of the foregoing groups.

The treatment in the first case consisted of surgery according to the technique of Schuckardt: total extirpation of the vagina, uterus, and adnexa under spinal anesthesia. For the cases of Grades II and III, respectively, the surgical approach was by way of the combined vagino-abdominal routes, and the anesthetic was again spinal. Accidental section of the ureter in one case necessitated re-implantation into the bladder with the technique described by Wagner, but subsequent development of a urinary fistula required unilateral nephrectomy. The case belonging to Grade IV was associated with such widespread metastasis that it was omitted from the presentation. Only the case of Grade II cancer received postoperative radiation.

The results were uniformly good and the cures ranged from one to two-and-one-half years' duration. The author attributes his results to three factors; (a) pre-operative and postoperative care, including anti-pyogenic vaccine and repeated blood transfusions; (b) precise dissection of the genital structures with wide extirpation of the lymph glands; and (c) routine drainage in all cases, preference being expressed for the Mikulicz drain.

The roentgenotherapists find that surgery gives a mortality of from 15 to 20 per cent and that only 3 per cent of the results are lasting, with slightly improved results from combined surgery and radiation, whereas radiation alone gives lasting results in from 12.5 to 18 per cent of all cases. Therefore, they believe that these cases should be treated by radiation.

The author does not advocate surgery in all cases of cancer of the vagina, but he does believe that surgery is not as disastrous as it has been presented, and is still accompanied by some satisfactory results.

GEORGE C. FINOLA, M.D.

MISCELLANEOUS

Frank, R. T., Goldberger, M. A., Salmon, U. J., and Felshin, G.: Amenorrhea. *J. Am. M. Ass.*, 193, 109: 1863.

Of 27 cases of both primary and secondary amenorrhea, 5 were studied less than one month and the remainder from one month to more than one year. The ages of the patients varied from twenty to thirty-seven years. Of the 18 married patients, 16 were sterile. The secondary amenorrhea had existed from five months to nine years. The 6 patients with primary amenorrhea ranged from twenty-three to thirty-three years of age. Twenty-four of the patients showed no endocrine stigmas; 3 had hirsuties and, of these, 2 had an enlarged clitoris.

In 21 cases complete studies of the urinary excretion of estrogens were made for more than one month. The patients fell into 4 groups according to the amount of estrogens in the excretion:

1. Those with from 50 to 100 mouse units as the total monthly excretion (low). There was no positive estrogenic reaction in 40 c.cm. of blood in any of 7 cases.

2. Those with from 500 to 518 mouse units (subthreshold). Two of 5 showed estrogen in the blood

3. Those with from 1,000 to 1,714 mouse units (normal excretion). Four of 6 showed some estrogen in the blood.

4. Those with from 2,075 to 2,328 mouse units (excessive excretion). All showed estrogen in the blood. In the authors' series this group, which presented Zondek's "polyhormonal amenorrhea," was less numerous than anticipated.

In 10 cases complete studies of the urinary excretion of gonadotropic substances were performed for one month or more. The patients fell into 2 groups:

1. Those with high and continuous gonadotropic excretion (4 cases). All 4 of the aforementioned estrogenic groups were represented.

2. Those without gonadotropic excretion (6 cases). Again all 4 estrogenic groups were represented. The gonadotropic blood and urine secretion could not be correlated to the estrogenic conditions, and therefore differed from that of normal women in whom the blood and urine show pre-ovulatory accumulation, and that of patients in the menopause in whom the blood and urine show continuous and increased amounts of gonadotropic excretion.

The doses of estrogen given for therapeutic effect to amenorrheal patients varied between 16,000 and

690,000 rat units (80,000 and 3,450,000 international units). Less than 200,000 rat units gave no response. Even with the large doses employed a single uterine bleeding followed in only 2 cases and scant spotting in 2. Approximately one-tenth of the estrogen given is excreted in the urine. Gonadotropic substances, extract of pregnant mare's serum and extract from the anterior lobe of the pituitary gland in dosages of from 60 to 510 rat units produce no effect. In contrast to the foregoing groups were patients afflicted with obesity, malnutrition, and hypothyroidism, who uniformly responded to appropriate therapy.

Amenorrhea does not preclude the occurrence of ovulation or pregnancy. The response to estrogenic therapy of amenorrheal patients differs markedly from the response in the menopause. The threshold of response in amenorrhea is far higher than in the menopause. This difference can be utilized in patients to differentiate between the two conditions, if an excess of gonadotropic substance has been found in the urine. Disappearance of gonadotropic substance produced by 30,000 rat units of estrogenic substance warrants the diagnosis of menopause.

No useful purpose is served in prescribing estrogens for the treatment of amenorrhea. In the dosage used by the authors, gonadotropic preparations likewise proved ineffective. It is justifiable to try a very high dosage of gonadotropic preparations when these become available.

This study has failed to locate the cause or causes producing amenorrhea. Not only refractoriness of the ovary or the anterior lobe of the pituitary gland, but also failure of uterine response must be considered in the etiology.

Finally, menstruation returns without any treatment or ascertainable cause in a considerable number of patients. CHARLES BARON, M.D.

Kennedy, W. T.: Incontinence of Urine in the Female, the Urethral Sphincter Mechanism, Damage of Function, and Restoration of Control. *Am. J. Obst. & Gynec.*, 1937, 34: 576.

Of 28 patients reported upon, 26 have had urinary control restored, 1 has an incontinence which may not be permanent, and 1 has sufficient incontinence to indicate the possibility of a second operation.

From observations in this study the sphincter mechanism may be described as made up of a free involuntary sphincter surrounding the inner third of the urethra, supported and enhanced by a voluntary sphincter composed of the anterior portions of the levator muscles, which unite in a median raphe beneath the urethra. The greater sphincteric force was found to exist about the middle third of the urethra. One may deduce that the above sphincter mechanism also lies around and beneath the middle third, having more and stronger fibers in this location.

A woman who has never been in labor but who begins to suffer a partial incontinence of urine due to loss of sphincter control may have had an incomplete union of the fibers composing (1) the involuntary sphincter and (2) the voluntary sphincter.

Labor may injure (1) the involuntary sphincter by directly or indirectly causing it to be distorted and fixed to the ramus of the pubis, thereby very markedly diminishing its function as a sphincter, and/or (2) the voluntary sphincter by splitting its fibers parallel to the urethra in or adjacent to the median raphe.

In the most difficult cases, namely, those previously operated upon for incontinence of urine and those in which the sensation of control or voiding was lost, continence was restored. The most important step of the operation is the free mobilization of the periurethral tissues from the rami of the pubic bones.

In 28 reported cases the only complete failure occurred in a case in which operation was followed by an infection in and sloughing of the anterior vaginal wall.

Since the method offered to restore continence of urine is followed by a reasonable degree of success, it is logical to deduce that the description of the sphincter mechanism is approximately correct.

EDWARD L. CORNELL, M.D.

Grad, H.: The Bissell Operation for Cystocele. *Am. J. Obst. & Gynec.*, 1937, 34: 589.

This article deals with a series of 100 cases of cystocele. Included in this group were 36 cases of procidentia uteri, 14 of which were of third degree. In 6 of the 14 cases (42.2 per cent) of complete prolapse, a vaginal hysterectomy was added to the Bissell operation, and in 1 case a Watkins interposition operation was performed.

There were 97 anatomical restorations of parts with symptomatic cures. The subsequent history in the 3 cases in which the operation failed was as follows:

One patient was re-operated upon a year after the first operation. A Bissell cystocele operation was again performed; this time it effected a cure. The second of these patients was successfully re-operated upon and is now able to wear a pessary which gives her complete relief. Before this operation she was unable to wear one. The third patient has a sagging of the cystocele, but is symptom-free and needs no further operative treatment.

EDWARD L. CORNELL, M.D.

THE LATE TOXEMIAS OF PREGNANCY (SO-CALLED NEPHRITIC TOXEMIAS OF PREGNANCY)

Collective Review

ROBERT D. MUSSEY, M.D., and ARTHUR B. HUNT, M.D., Rochester, Minnesota

CLASSIFICATION

OBSTETRICIANS recognize the need of concise, clear definitions of the so-called toxemias of the latter months of pregnancy; that is, the need of a standard working classification of these conditions.

It is not the intention of the writers of this résumé of the literature of the past few years to attempt to develop such definitions. We agree, however, with Peckham (83) that there is sufficient unanimity of opinion on this subject among various authors arbitrarily to drop the word "nephritic" from the title. The term "nephritic" implies that the so-called toxemias of pregnancy are owing to some nephropathy or that the nephritic condition antedated the pregnancy, whereas evidence indicates that the nephritic manifestations are not the cause but rather one of the manifestations of the toxemia; nor can the term "nephritic toxemia" be correctly applied to chronic nephritis, antedating the pregnancy. In a workable classification the so-called toxemias may be divided into the acute, non-convulsive (pre-eclamptic), and the convulsive (eclamptic) toxemias; the entire syndrome develops in the course of a given pregnancy and is distinct from the chronic cardiovascular-renal conditions with which the woman was affected prior to the pregnancy in question.

Kellogg (54), Peckham (83), Mussey and Randall (79), Herrick and Tillman, and others agree that there is a definite distinction between the chronic vascular or renal disease which antedates pregnancy and the acute, late toxemia which develops in the course of pregnancy and which may pass from mild to severe stages and may culminate in eclampsia. The allocation of all cases of toxemia into the preceding classification is manifestly impossible; the additional term "unclassified nephropathies" or the term "unclassified toxemias," employed by Stander, could be used to include the obscure cases and the rare or comparatively rare conditions, such as true acute nephritis complicating pregnancy and nephrosis of pregnancy.

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PATHOLOGY

The hypothesis that general vascular disease plays a large part in these toxemias of pregnancy is strengthened by pathological evidence, by clinical findings, and by follow-up studies. Irving stated that the hepatic lesions noted in 1931 by Acosta-Sison and in the same year by Davidson had been confirmed by, to use Irving's own words, "the work of our pathological laboratory." Irving went on to say that the hepatic lesions of eclampsia may consist of hemorrhage, necrosis, or fatty degeneration; that these lesions may occur in any portion of the lobules; that one, two, or all three varieties of lesions may exist in the same case; and that thrombosis of the radicles of the portal vein or of the small branches of the hepatic artery occupying the portal spaces may be found, which places the hepatic lesions on a vascular basis.

Schwarz and Dorsett confirmed the findings of Fahr and of Lubarsch in observing changes in the glomerular capillaries of patients who had died of eclampsia; the glomerular capillaries had distorted, and sometimes adherent, loops with poor cellular outlines and few nuclei. Bell found a glomerular lesion which he described as characteristic of the hypertensive toxemia of pregnancy; it presented enlarged glomeruli with narrowed and sometimes closed lumina, caused chiefly by marked thickening of the capillary basement membrane. Dunn and others supported Bell's findings. Kellogg (55) described material obtained at necropsy in a case of pre-eclamptic toxemia presented by Hertig, in which the lesions of the liver, kidneys, and brain were the same as those of eclampsia, except that the basement membrane of the renal glomerulus had not reached the stage of irregular thickening maintained by Bell to be characteristic of eclamptic kidneys.

Describing the pathogenesis of eclampsia, Addis stated that angiospasm is a common pathogenic factor underlying and uniting all the varying expressions of eclampsia. He commented that angiospasm spreads out into the various tissues

and organs and produces effects which in themselves appear to be completely unrelated. In the brain it results in hypertensive encephalopathy; in the kidneys, in albuminuria and oliguria with urine of high specific gravity; in the liver, in periportal necrosis; and in the subcutaneous tissue, in anasarca. He suggested that these variations are the result not of varying causes but of the variety of tissues in which the angiospasm acts, and that there is a single pathogenic factor underlying and uniting all the manifestations of eclampsia, namely, angiospasm. McKelvey and MacMahon presented similar observations on the lesions in the vascular systems of patients injured by toxemia of pregnancy who later had died. Zimmerman and Peters published a report of 23 cases, including findings at necropsy, which indicates that some of the patients who died of eclampsia had evidence of antecedent or accompanying pyelonephritis. Yet Acosta-Sison reported evidence of pyelonephritis in only 1 case of 38 in which necropsy was performed after death from eclampsia.

IDEAS OF ETIOLOGY

Hypotheses of etiology given in the recent literature are predicated on many possible factors, among which are: absorption of toxins resulting from pathological changes in tissue, excessive or pathological internal glandular secretions, focal or other infection, and faulty diet and allergy.

Bartholomew and Kracke postulated that hypercholesterolemia of pregnancy may predispose to placental infarct, autolysis of the affected tissue, and may be related to the production of peptone, guanidine, and histamine, which produce the pathological changes of eclampsia. Tenney observed that syncytial degeneration was definitely increased, both in the amount of tissue affected and in severity, in cases of pre-eclampsia and especially in those of eclampsia.

Hofbauer postulated that the absorption of syncytial proteins and ferments from the placenta impairs the function of the liver and the capillaries and causes hyperactivity of the pituitary body, along with the adrenal and thyroid glands; this hyperactivity in turn causes derangement of inner oxidation and of water metabolism, and arteriolar spasm in vital organs. Following the publication of Hofbauer's hypothesis, both Hurwitz and Bullock, and Byrom and Wilson working independently, failed to find pressor and anti-diuretic substances in the blood of patients who had toxemia of pregnancy. However, Hoffman stated that this hypothesis has received a series of confirmations. He stated that Marx found four times the normal amount of anti-diuretic component of the posterior lobe and that Bohn, Marx, and Eufinger found vasopressor substances of hypophyseal character in the blood of eclamptic patients. Melville cited research which indicates that the anti-diuretic substance described by Anselmino and Hoffman has not been adequately proved to be pituitary hormone.

Smith and Smith (100, 101) found remarkably consistent curves representing prolan and estrin in the blood and urine throughout pregnancy, and unmistakable variations of these curves in the late toxemia of pregnancy. In toxemia, excess amounts of prolan with a tendency toward a low value for estrin were characteristic. The authors offered the suggestion that overproduction of prolan by the placenta is perhaps a related, if not a causal, factor in the etiology of the toxemia of late pregnancy. From an analysis of weight, hirsuties, stature, facies, form of pelvis, and observation of a relatively low basal metabolic rate among a group of pregnant women, Vorzimer and his co-workers concluded that the large majority of instances of toxemia of pregnancy occurs among women whose constitutional habitus is in itself a manifestation of endocrine disturbance.

In a review of 420 cases of toxemia, Peters and his co-workers found that 13 per cent of the patients suffered at one time or another from conditions usually included under the term "pyelitis" or "pyelonephritis." Hayes cited 20 cases of pre-eclamptic toxemia and eclampsia "cured" by ureteral drainage of the kidneys to relieve back pressure, which he postulated as the cause of the toxemia. In a somewhat different application of the hypothesis of infection, Johnston, Johnson, and Nicholas found that focal infection affecting the placenta releases tyramines, which produce the toxemic syndrome. However, Theobald had previously observed the almost complete absence of eclampsia in Siam, where infection of the urinary tract is prevalent. Strauss has noted the relationship of nutritional deficiency, hypoproteinemia, and elevated venous pressure to the retention of water in pregnancy. He corroborated the observations of Eufinger, Plass, Eastman, and others who found a lowered concentration of plasma protein in pre-eclamptic toxemia and eclampsia. On the contrary, Dieckmann found a concentration of the blood and plasma, which he stated is not the cause of the eclampsia but "is intimately associated with the convulsions, coma, oliguria, and the various cerebral, visual, and gastro-intestinal symptoms." McIlroy (68) offered the hypothesis that a considerable proportion of the toxemias of pregnancy arise as a result of an inborn error of metabolism and that the

process depends to no small degree on dietetic factors, such as an inadequate supply of iron, iodine, calcium, and possibly other inorganic substances. Richardson studied the calcium content of the blood of normal and lactating pregnant women and of those who had pre-eclampsia and eclampsia, and he expressed the belief that the weight of evidence indicates that deficiency of calcium is a primary factor in pre-eclamptic toxemia. He expressed the opinion that there is strong evidence to support the hypothesis that guanidine is responsible for eclamptic convulsions and that under ordinary conditions guanidine is neutralized by calcium.

It is not surprising to find late toxemia of pregnancy among the many diseases attributed to allergy. Knepper's experiments with injection of the hormone of the posterior lobe of the pituitary body produced in the organs changes typical of eclampsia, and he suggested that this indicates that eclampsia is a combination of increased production of the posterior pituitary hormone with an allergic reaction in the tissues. Jegorow offered the hypothesis that eclampsia is of allergic origin, and Coope expressed the belief that the allergic hypothesis is more than a groundless speculation. Moore and Williams stated that anemia is a predisposing cause of the toxemia of pregnancy, as they have noted that the incidence of the signs and symptoms of toxemia is higher among untreated patients who have anemia.

PATHOGENESIS

The concept of the presence of a general vascular disturbance in the late toxemias of pregnancy was advanced by Volhard, in 1919. He postulated that this vascular change is at first a functional condition, which in the kidneys produces ischemia of the capillary loops, an angiospastic type of anemia. This hypothesis was strengthened by the observations of Hinselmann (44), Baer and Reis, and others, who noted evidences of spasm of the capillaries of the nail fold in cases of pre-eclampsia. Hinselmann and his coworkers found similar capillary changes in the kidneys of most eclamptic patients. Changes in the arterioles of the retina were noted by Wagener (113) and others, who observed definite evidence of arteriolar spasm which might vary from day to day. In fact, Wagener (113) could determine, in most instances, whether the patient was better or worse, by following the retinal changes. His findings have been corroborated by Masters, Hallum, and Selinger, all ophthalmologists. In 1927 Corwin and Herrick stressed the etiological relationship between acute cardiovascular disease and toxemia of the later months of pregnancy. Mussey and Keith, and later Mussey and Randall, agreed that generalized capillary and arteriolar disease offered an adequate explanation for the vascular and renal symptoms of this disease. Irving, Herrick and Tillman, Addis, and Eastman have made especially notable contributions in support of, and Coope has accepted evidence of, the presence of vascular involvement in the form of arterial spasm, in pre-eclampsia and eclampsia.

This conception of the presence of a widespread vascular lesion in the late toxemias of pregnancy has aided in an understanding of the permanent cardiovascular or renal injuries which may follow toxemias of pregnancy. The full realization that the condition of numerous women who have chronic cardiovascular disease or chronic nephritis is definitely the result of previous acute pre-eclamptic toxemia, or eclampsia has been brought about by many follow-up studies. Corwin and Herrick's article, previously mentioned, gives an excellent survey of chronic cardiovascular and renal disease resulting from acute toxemia of pregnancy. In other articles, prior to 1930, by Caldwell and Lyle, Harris, Rockwood, Mussey and Keith, and by Peckham (81), the authors had stressed chiefly the then meager evidence that in many of the cases in which patients were severely ill with acute toxemia of pregnancy, chronic nephritis subsequently developed. Follow-up studies will be considered in more detail later.

INCIDENCE

The incidence of the acute late toxemias of pregnancy is probably higher than previous figures would indicate. A quarter of a century ago pre-eclamptic toxemia was said to occur in association with several of every 100 pregnancies. Stander reported in 1929 that the incidence of late toxemias of pregnancy, including nephritis, was about 8.5 per cent; in 1936 he raised this figure to about 10 per cent. Peckham stated that his figure, based on the total of registered patients on his hospital services, is 17+ per cent and he estimated that the incidence is between 10 and 15 per cent for the child-bearing population at large. While they were collecting 173 instances of eclampsia among 168 patients, Teel and Reid found a gross incidence of 1 case of eclampsia in 320 pregnancies but, excluding 127 emergency cases, the corrected incidence was 1 case of eclampsia in 1,200 cases registered in a prenatal clinic. Hauch and Lehmann found in Denmark an incidence of 1 case of eclampsia in 571 pregnancies. Kjelland-Mordre of Oslo reported that an investigation of 52 pregnancies of 48 women who previously had

had eclampsia showed that 30 had recurring renal involvement in the course of pregnancy. Kellogg (55), and later Mussey, reported recurrence of toxemia of 80 and 57 per cent, respectively, in groups of patients who had been observed to have toxemia during 2 or more pregnancies.

DIAGNOSIS OF CHRONIC VASCULAR OR RENAL DISEASE ANTEDATING PREGNANCY AND OF ACUTE LATE TOXEMIA OF PREGNANCY

It is often difficult and sometimes impossible to distinguish between either pre-existing chronic general vascular sclerosis or chronic nephritis (glomerulosclerosis), which may complicate pregnancy, and the acute toxemia which makes its appearance in the latter months of pregnancy. Because of this difficulty in diagnosis it is not possible to discuss the late toxemias of pregnancy without considering also these chronic vascular or vascular-renal conditions.

In many cases chronic hypertensive disease or chronic nephritis is discovered only when the patient presents herself for prenatal examination, although most of those cases in which the condition is caused by toxemia in a previous pregnancy could have been detected by persistent postnatal follow-up examinations. Peckham (82) stated that in a large proportion of cases in which hypertension and albuminuria are manifested in the course of pregnancy, the condition is on a basis of pre-existing vascular disease and that the course of a pre-existing vascular disease is accelerated markedly by pregnancy and the patient is left in a much more serious condition than before. One may add that so-called occult nephritis may not be amenable to diagnosis prior to pregnancy and some of the patients who are mildly hypertensive may pass through pregnancy without superimposed toxemia. Kellogg (55), Peckham (82), and others agreed that the differential diagnosis between the "nephropathies" and pre-eclampsia is not always possible. Kuder and Stander found that repeated applications of the creatinine excretion test, the urea-clearance test, and the fifteen-minute phenolsulphonphthalein test are of value in making a diagnosis of chronic nephritis and that normal values determined on chemical examination of the blood do not rule out chronic nephritis so mild as not to cause retention of nitrogen. Cadden and McLane agreed with these statements and recommended the urea-clearance test as the most sensitive method so far devised to recognize early or mild nephritis. In addition to agreeing with Stander concerning chemical determinations on the blood, Peckham (82) pointed out that three clinical factors are of value in the diagnosis of mild arteriosclerotic nephritis: (1) the appearance of hypertension and albuminuria in the first two trimesters of pregnancy point toward nephrosclerosis rather than toward acute toxemia, which usually does not manifest itself before the last lunar month and rarely before the seventh month; (2) repeated or recurring toxemia is almost always on a nephrosclerotic basis; and (3) ophthalmoscopic examination of the retina in the presence of mild arteriosclerotic nephritis will reveal evidence of arteriosclerotic changes or albuminuric retinitis, while similar examination in the presence of acute hypertensive toxemia will reveal spasm of the retinal arteries, retinal edema, and occasionally hemorrhage or detachment. We are heartily in accord with Peckham's (82) three clinical diagnostic factors. Among these factors the early appearance of symptoms is probably of greatest clinical importance. The value of retinal examinations in the majority of cases of acute toxemia and in those of marked chronic arteriosclerotic nephritis is evident, but we have seen an appreciable number of cases of mild chronic nephritis in which there were no demonstrable retinal changes. Mengert stated, "The ease of diagnosis of existing or pre-existing renal disease depends largely on its severity. The more severe the kidney lesion, the earlier in pregnancy it becomes manifest and the easier its diagnosis."

While tests of renal function are often of value in cases of well marked chronic arteriosclerotic nephritis, few observers seem to believe that chemical examinations of the blood are commonly of much practical value in acute toxemias. Stander and Cadden stated that chemical analysis of the blood is an indispensable index of the severity of the disease and of specific treatment needed. They found that the uric-acid content of the blood is increased in eclampsia and pre-eclampsia, which indicates its failure of destruction in the liver and that its concentration in the blood is a fairly safe criterion of the severity of the disease; they found, also, that the carbon-dioxide combining power is the most readily available index of the decrease of alkali reserve, which may indicate the necessity of treatment to combat acidosis. Kellogg (55) remarked that the increase of uric acid in severe pre-eclamptic toxemia is not always present. Dieckmann (20) found that the alterations in blood volume and plasma volume in eclampsia and in pre-eclampsia are identical but that they are definitely at variance with those in chronic hypertension or nephritis. He advised tests for determination of non-protein nitrogen when the urine passed in twenty-four hours in a case of pre-eclamptic toxemia or of eclampsia is

less than 1,000 c.cm. and the specific gravity is less than 1.010. Dieckmann (19) also expressed the belief that microscopic examination of the urine, if done by the Addis method, which entails examination of a concentrated specimen collected over a known period of time, has been of the utmost value for diagnosis, prognosis, and treatment.

In a recent review of the literature, Kellogg (55) stated that tests of renal function are not dependable and that dilution and concentration tests of the urine give abnormal values in the course of a normal pregnancy. Randall, Murray, and Mussey employed the cold test as a prenatal examination, to estimate reaction of the vasomotor system in response to cold. In a preliminary report on its use in 104 cases, they said that in none of those cases in which the response was persistently normal had toxemia developed and that a third of the patients who had a hypertensive reaction afterward presented the usual signs of toxemia in the later months of pregnancy. These observers did not use the cold test on toxemic patients as did Dieckmann and Michel (21, 23), who reported no uniform results in this group of cases. This cold pressor test may prove to be of value as a test in early pregnancy to determine the cases in which toxemia of late pregnancy is more likely to develop. Dieckmann and Michel (22) observed the vascular renal effects of posterior pituitary extracts on pregnant women. They found that both the decrease in the volume of urine and the average rise in systolic blood pressure which occurred when these extracts were injected into normal, pregnant, parturient, and puerperal women were much more marked when the extracts were given to pre-eclamptic patients than to those not afflicted with pre-eclampsia. They concluded that the "pituitrin test" may aid in distinguishing pre-eclampsia from other toxemias of pregnancy and if used early in pregnancy may make possible the detection of cases in which pre-eclampsia may develop subsequently.

COMMENT ON DIAGNOSIS

Recent literature on differential diagnosis indicates that (1) the appearance of the symptoms of hypertension and albuminuria in the first or second trimester of pregnancy is almost conclusive evidence that at least some degree of general vascular or glomerular injury antedated the pregnancy; (2) examination of the retinas of such patients usually will reveal evidence of previous acute vascular or renal disease; (3) certain chemical examinations are of diagnostic value when the previous injury has been severe enough definitely to lower the function of the renal glomeruli or in cases of acute pre-eclampsia when the function of the liver is definitely disturbed; (4) the cold test seems to indicate, by the degree of vascular response, which women are susceptible to the development of hypertensive disease; and (5) the pituitrin test may prove to be a valuable aid in differential diagnosis when used early in pregnancy.

TREATMENT

Chronic hypertensive vascular disease and chronic nephritis. The methods used in management of patients who have chronic hypertensive vascular disease or of those who have chronic glomerulonephritis depend on the degree of vascular or renal involvement and the definiteness or, perhaps one should say, ease in making the diagnosis. Those patients who exhibit a mild degree of hypertension early in pregnancy, who were represented by Kellogg (55) in a hypothetical case with a systolic blood pressure of 140 mm. of mercury and a diastolic blood pressure of 90 mm., or even perhaps with a somewhat higher systolic pressure, who have at most a trace of albuminuria, whose renal function is within normal limits and whose ocular fundi do not reveal appreciable evidence of hypertensive change or of the "retinitis of nephritis" may be treated expectantly. If treatment is expectant, physician and patient must accept more than the average risk of aggravation of the existing condition by superimposed toxemia, for Tillman, Teel and Reid, and others have shown that there is a marked tendency for acute toxemia to be superimposed on these chronic vascular conditions. Kellogg (55) properly queried: What results may we expect? Will the pregnancy be successful and at what cost? Will it fail with perhaps irreparable damage or will it fail or succeed with no apparent damage? If the chronic hypertension is of the so-called essential type, and is unassociated with lowered renal function, the patient has a much better chance of carrying through successfully than if the condition which is present followed an acute toxemia late in a previous pregnancy. The patient may have a normal or a practically normal blood pressure and evidence of, or a history of, a very mild degree of chronic nephritis; we agree with Kellogg that such a patient may pass through pregnancy successfully. When such a patient is treated expectantly it is highly important to carry out a regime of moderate diet, regular bowel movements, and definite limitation of activities. Sufficient sedatives to control nervous irritability should be given, and the use of alcohol, tobacco, and stimulants should be forbidden.

In the presence of chronic vascular disease of more than mild degree, or in the presence of definite chronic glomerular nephritis, the belief expressed by Kellogg (55), Stander, Peckham (82), Dieckmann (19), Goodall, and others is that interruption of pregnancy should be advised in the interest of the mother. At best, the fetal mortality is high and in many of the severe cases the fetus dies in utero in the course of the second or early in the third trimester, and labor ensues. Kuder and Stander found that more than 40 per cent of women died within ten years of chronic nephritis recognized in the course of pregnancy.

Herrick summarized the indications for abortion in chronic arteriosclerosis and chronic nephritis as follows: "If the disease is manifest at conception, abortion should be done promptly. If the disorder has been latent and arises early in pregnancy, and if it is marked by a considerable albuminuria which tends to increase despite treatment, it is unlikely that pregnancy can succeed. In the interest of maternal welfare it should be terminated. If to albuminuria is added edema or hypertension, this action becomes obligatory. If the symptoms of nephritis do not appear until the second half of gestation a somewhat different attitude is to be taken. One is confronted with the question whether or not the pregnancy can be carried to viability. In such a situation much judgment and not a little courage are required. If nephritic symptoms are mild and do not progress rapidly, delay may be safe and the child may survive despite albuminuria, edema and hypertension. However, if the disturbance advances and if to these cardinal features are added serious visual disturbances, threatening blindness, advancing nitrogen retention, deviations from normal mentality, twitching, greatly exaggerated reflexes or convulsions, the uterus should be emptied promptly without regard for the fetus."

Williams stated that even in the less severe cases of permanent "arteriolar sclerotic nephritis," the procedure of interruption of pregnancy followed by sterilization is being adopted rather generally. Williams, Mendenhall, Dieckmann (18), and others have used hysterotomy combined with sterilization if gestation has progressed to the third month or beyond, and Dieckmann mentioned the employment of hysterectomy in selected cases. In older women Williams employed roentgen rays for the purpose of sterilization.

Acute non-convulsive toxemia. Many writers have expressed the belief that the same factor appears to be responsible for the various conditions included among the late toxemias of pregnancy; that mild and severe pre-eclamptic (non-convulsive) toxemia differ in degree only and tend to proceed to the stage of eclampsia (convulsive toxemia). Herrick, Tillman and Grebene, Kellogg, Mussey, and Randall, Dieckmann (19), and others expressed the opinion that low reserve kidney, so-called albuminuria of pregnancy, and mild pre-eclamptic toxemia are probably the same condition. According to Peckham and Stout, Douglas, and others, in about a third of the cases in which the diagnosis of "low reserve kidney" has been made later, the same residual injuries have been found as have been found in cases of true toxemia. These writers have expressed the belief that for purposes of therapy, the patients who have mild as well as those who have severe toxemia should be considered as potential eclamptic patients and may, after parturition, harbor a residue of chronic arterial or renal disease.

The significance of the appearance of the classical signs of incipient pre-eclampsia, such as more or less elevated blood pressure (135/90 or more), excessive gain in weight and edema, and slight albuminuria, finds repetition in the recent review by The American Committee on Maternal Welfare (117). In addition to selecting individuals who present these signs for closer and more frequent prenatal examination, mild sedation, rest, and dietary restrictions (reduction of intake of sodium chloride and proteins) are prescribed. Strauss, Eastman, and others expressed the belief that the intake of protein need not be restricted, as the serum proteins may be low (in the presence of albuminuria), a finding Dieckmann has not been able to confirm. McIlroy (68) and other British obstetricians gave as their opinion that a diet sufficient in vitamins and in inorganic constituents, such as calcium, iron, and iodine, is vital in preventing and treating pre-eclampsia. Thomas and others stated that calcium is useful in replacing the sodium ion, promoting diuresis, and protecting the liver. Mendenhall and Drake seemed to observe some lessened incidence and severity of pre-eclampsia with the administration of calcium and Vitamin D, although no claims for its use were advanced. However, Richardson (88) was convinced that the use of sufficient Vitamin D during pregnancy will definitely lessen the incidence of pre-eclamptic toxemia and eclampsia.

The Smiths (100, 101) and Heim pointed to a constant elevation of prolan with depressed estrin in pre-eclampsia and eclampsia. This has led Shute to employ estrin in the treatment of a very small group of pre-eclamptic patients. On the contrary, Robson and Paterson used progesterone in 12 cases of pre-eclampsia and noted clinical improvement, with no convulsions or mortality.

The symptoms of true pre-eclamptic (non-convulsive) toxemia rarely become evident before the third trimester and often not before the last month of gestation. If a systolic blood pressure of less than 150 and a moderate amount of albumin in the urine are selected as indicative of the upper limit of mild toxemia, it may be assumed that most of the patients who exemplify these signs should be observed frequently and need not be hospitalized unless the evidences of toxemia become more marked. When this occurs, or if progressive changes in the retinal arterioles are observed, as occasionally they are in this group of cases, the patient should be hospitalized. Sometimes an initial rise in systolic blood pressure, to 160 or more, places the patient immediately among those who have severe toxemia, or perhaps the patient may be observed for the first time late in pregnancy and marked hypertension or albuminuria may be discovered. In either event, immediate hospitalization is highly desirable. Often the condition of the patient who has severe pre-eclampsia so nearly approaches the eclamptic state that employment of measures to prevent development of convulsions should be carried out diligently. Kellogg (55) stated that the treatment of pre-eclampsia should be as radical as the treatment of eclampsia is conservative. He, Rosensohn, and others recommended treatment essentially similar to that advised by The American Committee on Maternal Welfare; that is, rest, quiet, sleep; light, mixed, salt-free diet; adequate bowel movements induced by the administration of gentle laxatives or enemas; balanced fluids; observation, including recording of blood pressure and output of urine; and interference when necessary. McNeile reported on 799 patients who had late toxemia of pregnancy and who were treated with magnesium sulphate, with only 4 deaths; 259 were of the eclamptic type. If necessary, 20 c.cm. of a 10 per cent solution of magnesium sulphate are given intravenously every hour, for as many as 6 doses. McNeile expressed the belief that the administration of magnesium sulphate, together with carbohydrates, to severely sick patients has the effect of eliminating radical surgical operation, except when it is clearly indicated. May quoted Arnold and Fay's program of dehydration and reported that among 20 pre-eclamptic patients so treated, eclampsia, abruptio placentæ, or maceration of the fetus did not develop and all carried to term. Several authors have noted the value of intravenous administration of glucose solutions in producing diuresis and hepatic regeneration.

Gustafson, Rosensohn, Kellogg (55), and others warned that failure of improvement or increase in the severity of symptoms indicates the necessity of termination of the pregnancy. In addition to hypertension and other findings, Mussey, Wagener (114), Masters, Hallum, and others have found study of the retinal arterioles of value in determining whether and when pregnancy should be terminated. However, Kellogg (55) and Falls failed to find it of definite value for this purpose. Gustafson stated that the method of interference may depend on a number of factors: the age, parity, and general condition of the patient, the duration of pregnancy, and the condition of the cervix. Gustafson advised insertion of a bag or rupture of the membranes if the bony passage is adequate and the condition of the cervix permits. Kellogg (55) has discontinued the use of the bag but he agreed, as do many others, that rupture of the membranes often is indicated. When induction is indicated and the need is not urgent, we are among those who sometimes employ medical means of induction; if successful, this obviates the necessity for mechanical intervention, but such intervention can be used later if necessary. Kellogg (55), McNeile, and Gustafson advised against abdominal cesarean section unless the age and condition of the patient, the condition of the cervix, or the type of pelvis indicate its necessity; if cesarean section is performed, local anesthesia is preferred.

Eclampsia. Adair, among others, emphasized the generally accepted fact that adequate prenatal care will do much to eliminate eclampsia. In spite of this care, and of every known method of treatment, eclampsia may occur and may be fatal. Eclamptic convulsions present an immediate emergency which calls for active but not radical treatment. The necessity of controlling the convulsions is obvious. At the same time, therapy is instituted to relieve edema and promote diuresis, to protect the liver, to prevent the development of dangerous acidosis, and, at the proper time, to terminate pregnancy, if this becomes necessary.

ACTIVE TREATMENT

Sedation. Sedation requisite to control the convulsions should be used promptly as soon as eclampsia develops. Dieckmann pointed out that, "since all drugs are toxic in doses necessary to control the convulsions, we prefer to use several simultaneously. Smaller amounts are, therefore, required and the undesirable effects of each are minimized."

Morphine. Morphine for years has been the most dependable drug, because of its sure sedative action and its general availability. The dosage

varies from ¼ to ½ grain (0.016 to 0.032 gm.) according to the apparent severity of the toxemia and the weight of the patient. Whether the dose should be repeated depends on whether other sedatives are used and on the progress of the disease. Kellogg (55) stated, "Morphia in any quantity produces torpor and its aftermath may be irritability." Morphine also has the disadvantage of increasing existing acidosis by respiratory depression.

Solution of magnesium sulphate. This substance, first reported by Lazard for the treatment of eclampsia, is commonly used intravenously or intramuscularly. In addition to its sedative effect, it relieves edema and promotes diuresis. Use of this drug forms an important part of the conservative treatment employed by Lazard, McNeile, Rucker, and others, with excellent results in large groups of eclamptic patients. McNeile expressed the belief that larger doses can be given with more safety than formerly was supposed. He stated that he gives 20 c.cm. of 10 per cent solution intravenously, repeating every hour or so up to 6 doses, or until the convulsions are controlled. Following the use of magnesium sulphate, McNeile had not seen any disturbance of respiration or any deleterious effect. However, Kellogg advised the use of not more than 6 gm. of this drug in twenty-four hours; Hirschfelder warned against hypermagnesemia, particularly after oral administration, and Dieckmann warned against the use of large doses when oliguria or anuria is present.

The barbiturates. Phenobarbital and phenobarbital sodium, pentobarbital sodium and sodium amytal (sodium isoamylethylbarbiturate) all have proved valuable as adjunct sedatives and the latter two have been reported by some writers to have successfully controlled convulsions when given with caution intravenously. Ross discussed the use of pentobarbital sodium and Gustafson, Lewis, King, Mayer, and Ayo the use of sodium amytal for this purpose. In selected cases of eclampsia we have given from 6 to 7½ grains (0.4 to 0.48 gm.) of pentobarbital sodium slowly, intravenously, with large volumes of solution of glucose, and have had success. McGee expressed the opinion that large doses of barbiturates lowered the blood pressure so that oliguria might develop.

Chloral hydrate. Fantus used this in conjunction with morphine; Dieckmann (19) said that this drug is not above suspicion as a hepatic toxin, that it is a powerful cardiac depressant, and that its use is no longer necessary, now that equally effective sedatives are available.

Glucose. Dieckmann (19), Kellogg (55), Peckham (83), Gustafson, and others recommended the giving of solutions of glucose intravenously, in varying volumes, in concentrations of from 10 to 50 per cent, depending on the degree of dehydration desired. This seems at present the substance commonly employed to produce diuresis. A chemically pure, properly prepared solution of glucose is not toxic and the wide favor with which it is regarded is deserved, not only because of its efficiency as a diuretic, but also because it helps both to protect the liver and to decrease acidosis.

Digitalization. Digitalization has been recommended for use in some cases by Kellogg (55) and others, and Caffier has urged care of the heart in eclampsia as he thinks some of the deaths are from cardiac strain.

Venesection. Dieckmann stated that the results of treatment indicate that venesection is not essential in eclampsia. The blood volume is already temporarily too greatly decreased and many patients are anemic. There may be a limited place for venesection if pulmonary edema develops. Atropine and oxygen also are to be employed if pulmonary edema is present. Gustafson and Fantus stated that inhalation of oxygen may be useful following convulsions or at any time that cyanosis is present. A constant appraisal of the patient's condition and progress, as evidenced by frequent observation of urinary output, temperature, pulse, color, respiration, and blood pressure, is as much a part of the treatment as the carrying out of actual medication; results of the observations actually direct the treatment. When the patient is conscious and improving, especially after delivery, observation may be relaxed somewhat.

THE TERMINATION OF PREGNANCY

Although it is known, beyond much doubt, that products of conception are in some way responsible for the syndrome of eclampsia and that the convulsions usually stop when the uterus is emptied, nevertheless experience has shown that termination of pregnancy by surgical methods is generally inadvisable until the convulsions have been controlled. Almost all obstetricians are agreed that the mortality varies greatly with the time, method, and technique of delivery. The belief that forceful mechanical means of emptying the uterus are attended by a high maternal mortality can hardly be questioned. Plass, in a collective review, found the mortality following radical treatment was 21.7 per cent of 4,607 cases and only 11.1 per cent of 5,976 cases in which treatment was by the conservative or "combined"

method. Dieckmann (19) gave a table showing this and other comparisons, and The American Committee on Maternal Welfare (117) stated, "Careful investigation of the causes of maternal deaths throughout this country has shown that the maternal death rate is more than 20 per cent in many localities following cesarean section or other operative measures for eclampsia. Maternal mortality is reported to be about 5 per cent in series of cases in which treatment is primarily by medical measures. This is particularly true if medical treatment is carried out consistently before measures are used to terminate pregnancy."

The first consideration, then, is to stop the convulsions. The eclamptic state is accompanied by irritability of the uterus and, in many instances, the onset of labor occurs in the course of the convulsions. When labor does not ensue following cessation of the convulsions it is often not difficult, in our experience, to initiate it by giving from 1.5 to 2 fluid ounces (45 to 60 c.cm.) of castor oil by mouth, followed by discreetly directed, hourly repeated doses of from 1 to 2 minims of pitocin, given subcutaneously for several doses; these injections are discontinued as soon as labor-like uterine contractions begin. We have not observed any harmful effect following this procedure. If this fails, or if it seems advisable not to delay, the membranes should be ruptured. Rupture of the amniotic sac with loss of fluid, in itself, seems to have some therapeutic effect. Jaggard noted this in 1889 and is quoted by DeLee as saying, "Rupture of the membranes cures one-third, benefits one-third, and fails in one-third of the cases of eclampsia." Stroganoff found in 308 cases of eclampsia that it was unnecessary to resort to cesarean section when rupture of the membranes was employed. Stroganoff, Dieckmann, Rucker, McNeile, and others recommended this procedure as the method *par excellence* when mechanical means are needed for the termination of pregnancy. Dieckmann (19) suggested insertion of a hydrostatic bag into the lower uterine segment in rare instances after rupturing the membranes and drawing off the amniotic fluid. Cesarean section is reserved for obstetrical indications only, or in rare cases when the cervix seems too firm, too long, and not sufficiently effaced to warrant rupture of the membranes. Kellogg (55), Fantus, Gustafson, and others expressed the belief that delivery should be effected under local rather than under general anesthesia, or the use of the latter should be held to a minimum. The heavy sedation employed prior to delivery makes this easier. Chloroform is definitely contra-indicated in eclampsia because of its harmful effect on the liver. Fantus warned that ether increases the production of mucus in the bronchi and tends to produce pulmonary edema, and its use may be followed by pneumonia.

The opinion of most writers is voiced by The American Committee on Maternal Welfare (117) in advising that medical therapy be continued through labor and for a period long enough after delivery to be certain that the patient is recovering and out of danger of further convulsions.

The fetal mortality in eclampsia approaches 50 per cent, and Falls has made the excellent rule that the immediate care of newborn infants should be exacting, because frequently these infants are premature and are less vigorous than normal, because of toxemia transmitted from the mother. A maternal mortality of 5 per cent or less is at present an excellent figure for eclampsia. The importance of a quiet, restful environment and the avoidance of bodily injury are among other conditions emphasized in recent literature. Shute has treated a small number of patients who had eclampsia with estrin.

FOLLOW-UP STUDY

In 1932, under the title, "The late sequelæ of eclampsia," Rucker reviewed the reports by 4 observers of 118 cases of eclampsia in which the subsequent course of the patients was followed. A number of these patients had recurring eclampsia and many had recurring pre-eclamptic toxemia. Reviewing the subsequent pregnancies of 29 eclamptic patients, Tillman found that eclampsia recurred in only 2 cases, but in 38 subsequent pregnancies there was a 36.8 per cent incidence of toxemia. Siedentopf and Major, in Leipsig, noted, in the follow-up study of 16 eclamptic patients and 13 patients who had "nephropathies" of pregnancy, that from twenty-eight months to nine years later the cases in which there was damage to the circulatory apparatus and nervous system greatly outnumbered those in which true damage to the kidney had been done. Herrick and Tillman reported a study of toxemia of pregnancy over a period of fifteen years, during which time 930 patients were observed, 594 (52 per cent) of whom had been subjected to at least semi-annual examination by the medical staff. Of these 594 women, followed for an average of five and six-tenths years, 90 or 15.7 per cent, have died; this is almost seven times the average death rate for women between the ages of twenty and forty-five years. Herrick, Tillman, and Grebene concluded that it seems probable that the pathological changes characteristic of eclampsia, pre-eclampsia, and other vascular types of toxemia are not

transitory but, in more than 50 per cent of the cases, are permanent, and merge into those of chronic vascular disease. These authors later recorded their experience with a group of cases of milder toxemia which were classified variously as "nephritis, albuminuria of pregnancy, recurrent toxemia, and low reserve kidney." In the postpartum period in practically all of the cases there was a fall of blood pressure to normal but in 63, or one-third of 188 cases, hypertension was found on follow-up examination, with a range in systolic blood pressure of from 150 to 260 mm. Peckham (81), who repeatedly has noted the development of chronic nephritis following pre-eclamptic toxemia, found definite evidence of renal involvement in 32 of 63 cases in which the previous diagnosis was low reserve kidney, and in which the course of the patients was followed for five years or more. Gibberd, also, has made extensive follow-up studies of the nephritis which follows "albuminuria of pregnancy." Goodall repeated the observation that the longer toxemia lasts, the greater is the consequent damage to the organism.

According to Effkemann (27), following toxemia there exists often a latent vascular disease which in subsequent pregnancies may lead to nephrosclerosis, particularly if the women are more than forty years of age. However, Effkemann (28) expressed the belief that there is a gradual regression of residual renal changes, quicker after eclampsia than after the nephropathies and after pre-eclampsia, and that the residual renal conditions are relieved in the majority of cases after three years, or at most after from ten to fourteen years. Contrary to the opinion of many observers, he stated that the renal symptoms of women who have residual conditions are not influenced by subsequent pregnancies. Goodall stated that he had observed 5 cases of "true" chronic nephritis in which cure followed pregnancy. After their condition had been diagnosed as "chronic nephritis," the patients became pregnant against advice and, after one or two pregnancies, became free from high blood pressure, urinary albumin and urinary casts. In 1936 Peckham (82) added another contribution to his excellent follow-up studies of cases of pre-eclamptic toxemia. In this paper he stated that frequently one or two years must elapse before a decision can be reached concerning the remote results of toxemias of late pregnancy. He observed that the toxemic patient most likely to be left in a normal condition after pregnancy is the primigravida and one in the relatively early years of her period of childbearing; that the toxemic condition most likely to clear up does not manifest itself prior to the seventh month and only rarely before the ninth. He placed more emphasis than formerly on the general vascular involvement, and states that one year after delivery 23 per cent of 74 eclamptic patients harbored definite evidence of chronic vascular disease. Nuri added to the evidence of persisting vascular damage after eclampsia and pre-eclampsia by his investigation of the vessels of the retina many years after eclampsia. He found a larger percentage of women who had contracted vessels in this group than in a similar group of women who had not had eclampsia.

Bell wrote that a woman pregnant after eclampsia is ten times as susceptible to toxemia (recurrent in her case) as the average pregnant woman. In a comprehensive clinical and follow-up study of the total number of instances of eclampsia occurring at the Boston Lying-In Hospital over a period of twenty years, Teel and Reid noted that eclampsia is of much more frequent occurrence among neglected hypertensive and nephritic patients than among neglected patients previously normal; that the immediate mortality of uncomplicated eclampsia is much lower than it is when superimposed on pre-existing hypertensive disease or nephritis, and that among 29 patients, on whom follow-up examinations were carried out and who were known to have been healthy prior to eclampsia, none had albuminuria or evidence of impaired renal function, and only 3 had hypertension.

Contrary to the opinions of most observers, McIlroy (67) expressed the belief that chronic nephritis does not develop as a result of the toxemia of pregnancy, but that the hypertension or chronic nephritis was present before the patient became pregnant for the first time. Herrick has stated concisely the opinion which commonly obtains: "In extensive follow-up work from year to year the course and end of eclampsia, the nephroses and nephritides of pregnancy, unfold in the familiar forms of hypertensive cardiovascular disease or of true nephritis."

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OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Patterson, J.: The Chemical Diagnosis of Early Pregnancy. *Brit. M. J.*, 1937, 2: 522.

The author describes a biochemical test for the diagnosis of early pregnancy which is based upon bacterial splitting of estriol glycuronide and the subsequent development of the estriol color reaction with phenolsulphonic acid.

Urines from 65 cases in which the diagnosis of pregnancy was required have been examined by the test.

In the whole series there was only one error arising from the application of the chemical test to the diagnosis of early pregnancy, so that its accuracy can be said to approach that of the Aschheim-Zondek and Friedman tests. Two cases of doubtful positivity, however, would have required repetition one week later, while, on the other hand, one Friedman test had to be repeated because it gave a very doubtful reaction when the color test showed a definite positive reaction. The second biological test on a further sample obtained five days later confirmed the accuracy of the chemical diagnosis.

Most of the other tests that have been suggested as a means of diagnosis of pregnancy have had the merit of simplicity without that of reliability. With this test the reverse holds true, and it leaves something to be desired by way of simplification. However, investigation has shown that none of the steps can be sacrificed without impairing the general efficiency of the process; the only saving that might reasonably be resorted to would be to cut down to a single extraction those processes where two extractions have been adopted as the standard practice and use about twice the volume of the extracting medium. Therefore, if the time and labor involved in a single test be taken into consideration, it becomes doubtful whether such a technique could find general application for the diagnosis of pregnancy. However, when larger numbers are concerned and measures are taken to carry out five or six tests simultaneously, the method warrants more serious consideration as a practical alternative to the biological methods. To carry out such simultaneous extractions all that is necessary is the construction of a mechanical shaker to hold a number of separatory funnels.

At this stage one may conveniently summarize the advantages and disadvantages of the chemical method as compared with the biological tests. In favor of the former it can be pointed out that it enables a result to be obtained in twenty-four hours, whereas the most rapid of the biological tests usually takes forty-eight hours. It dispenses with animals, the upkeep of which is expensive, and which are subject to marked individual variation in sensitivity to hormone injection. Moreover, it can make use of specimens that have undergone some degree of putrefaction and have become toxic to test animals.

Its disadvantages are the more laborious technique, and the fact that the reactions are rather weak when the menstrual period is only two weeks overdue. There is also the possibility that the chemical test may be, in general, a few days behind the Friedman test in providing positive results in the very earliest stages of pregnancy. This, however, has not yet been sufficiently investigated.

Even though the method might not be adopted as a routine in the diagnosis of pregnancy because of its more tedious procedure, the very fact that it provides a much readier route to the approximate determination of excess of the preponderating estrogenic hormone than that by way of biological assay would seem to assure to it, or perhaps some slight modification adapted to larger quantities of urine, a rôle of some practical importance in the field of endocrinology. ROBERT M. GRIER, M.D.

Rock, J.: The Clinical Aspects of Ectopic Pregnancy. *New England J. M.*, 1937, 217: 765.

Since it is universally agreed that the proper treatment of ectopic pregnancy is prompt removal of the fetus and as much of the chorion as possible, the clinical aspects of this condition are mainly those of diagnosis.

Schumann states that the high, average mortality rate of such pregnancies is about 4 per cent.

The causes of ectopic pregnancy may be classified as those which prevent or delay the passage of the zygote through the tube, those which offer extrinsic nidatory facilities to the trophoblast, and those rare contingencies which permit fertilization within the follicle itself.

A common cause of delay in transit or of prevention of access into either the tube or the uterus is an anatomical change in the tube, due to abnormal development or disease. This explains the frequency of such cases among those who have been exposed to salpingitis by primary infection or by instrumental abortions, therapeutic or otherwise.

Perhaps a commoner impediment to the normal migration of the fertilized ovum into the fimbria, through the ampulla and isthmus and out onto the endometrium, is found in a disturbance of the hormonal control of the tubal musculature. Some form of an estrogen apparently conditions the tube to a stimulating influence which evokes active coördinated motion of fimbria, cilia, and muscularis; and this induces the fresh ovum to enter and, after fertilization, to pass on. It is thought that any disturbance in this effect of estrogen on the tube may favor fertilization outside the fimbria, or may account for a failure of the zygote to move on.

The third group of causes, those which permit impregnation within the follicle, are obviously quite

beyond our reach for the purpose of prevention. Spermatozoa, once released, are not yet amenable to stipulation of route or destination.

When prevention fails, therapy begins. A second obligation is to recognize the condition promptly. If the diagnosis is made before rupture of the maternal tissues which enclose the trophoblast, and diagnosis is followed by prompt surgical removal of the pregnancy with as much of this maternal tissue as is necessary, be it tube or ovary, then the mortality rate of this otherwise serious condition decreases to a small fraction of 1 per cent. Diagnosis is exceedingly rare before the death of the fetus permits the telltale bleeding from uterine decidua, or before distention of maternal tissues gives pain. Palpation of a swollen tube or cystic ovary may offer our only clue. Unfortunately, the uterus increases in size and softens under hormonal influence during the first two months, whether the pregnancy is within it or without. Examination, then, is directed not only to this organ but to the tubes and ovaries in order to make certain that no abnormal enlargement of the latter is present. When real doubt of the normality of the annexa exists, an Aschheim-Zondek or Friedman test by a competent biologist and examination under anesthesia are indicated. If there still is doubt of the normality of the tubes and ovaries and the pregnancy test is positive, exploration is justified or vigilant observation obligatory until the possibility of ectopic pregnancy is ruled out. Diagnostic curettage for the discovery of decidua without villi was formerly recommended by some investigators. If the suspected extra-uterine tumor is not a pregnancy, it is probably an inflammatory mass and curettage is dangerous.

If the experience which assures good judgment is lacking, conservatism, maintained in proximity to an operating room, is probably the safer choice until some objective sign or subjective symptom contributes to the clinical picture.

The earliest of the symptoms are pelvic discomfort, not acute pain, and spotting. Either or both of these may occur even before the patient suspects that she is pregnant. They are usually associated; both are rare while the fetus is young, alive, and small, but are almost universally present when the fetus is dead.

Death of the fetus and chorion withdraws the hormonal support of decidual tissue, and permits a release of the bleeding mechanism, which becomes promptly active in the decidua. Death of the fetus, probably also by the same withdrawal of hormonal support of the placental site, induces separation of the chorion from the decidua in the afflicted organ. This causes hemorrhage, distention, and pain.

The differential diagnosis should depend mainly on the temperature, the leucocyte count, and the sedimentation rate. If the diagnosis remains in doubt and the pregnancy test is negative, exploration is occasionally justifiable, provided the surgeon can resist meddling with an acute salpingitis, if this be found instead of the pregnancy. Alert observation of such doubtful cases is the safer procedure for all who have not had long clinical and surgical experience. J. THORNWELL WITHERSPOON, M.D.

Klaften, E.: The Diagnosis of Extra-Uterine Pregnancy by the Method of Transillumination, together with a Contribution on the Subject of Histiospectrography (Zur Diagnostik der Bauchhoehlenschwangerschaft mit Hilfe des Durchlichtungsverfahrens und zur Kenntnis der Histiospektrographie). *Zentralbl. f. Gynaek.*, 1937, p. 1986.

As a new expedient in the diagnosis of extra-uterine pregnancy the author discusses transillumination with the diaphanoscope. With transillumination of the abdominal cavity from the vagina there is seen an intensely illuminated, suprasymphyseal, reddish to red, shimmering area, the so-called abdominal wall-phenomenon. This symptom is characteristic for extra-uterine pregnancy and is absent in the presence of any of the inflammatory diseases of the pelvic and abdominal cavities, as well as in the presence of a normal pregnancy. The abdominal wall-phenomenon is explained as the result of a marked succulence and serous infiltration of the abdominal wall with accompanying intense hyperemia of the same. Circulatory disturbances and congestion in the region of the inferior epigastric vein are also causes. The phenomenon may be elicited even when trifling amounts of blood are found in the free abdominal cavity and from this fact it is concluded that there is no direct relationship between the extravasation of blood and the appearance of the phenomenon.

When the tubal pregnancy has been present for a considerable period, the manifestation disappears, apparently as a result of relief from the congestion and serous infiltration with the development of collateral circulatory paths.

As a second symptom there may be demonstrated, in addition to the dark-red symphyseal field, a lighted area in the lateral regions of the abdominal wall, where the blood and transudate have collected. This phenomenon is bound up with the area in the abdominal cavity where the fluids collect. It does not necessarily correspond to the side on the ectopic pregnancy, for the blood frequently collects on the opposite side.

In concluding, the author discusses the demonstration of intra-abdominal blood by the spectroscopic method, so-called histiospectrography. However, in this matter the studies of the author have not yet been concluded. The technique and apparatus are described in detail, for which the reader is referred to the original article.

(KARL KOCH). JOHN W. BRENNAN, M.D.

Irving, F. C.: The Conservative Treatment of Premature Separation of the Normally Implanted Placenta. *Am. J. Obst. & Gynec.*, 1937, 34: 881.

Three hundred and fifty-three cases of premature separation of the placenta are reported. In 234 of these there was external and in 119 internal hemor-

rhage. Among 170 patients with external hemorrhage who were delivered through the pelvis by simple means there were no deaths. In 30 cases of external hemorrhage treated by cesarean section, the death rate was 3.3 per cent. Among 69 patients with internal hemorrhage delivered by cesarean section the death rate was 14.5 per cent. In 34 cases of internal hemorrhage treated by conservative measures the mortality was 2.9 per cent. Conservative measures give a better prognosis for the mother in both types of premature separation of the placenta.

EDWARD L. CORNELL, M.D.

De Snoo, K.: Drinking by the Child in the Uterus (Das trinkende Kind im Uterus). *Monatsschr. f. Geburtsh. u. Gynaek.*, 1937, 105: 88.

That the child drinks the amniotic fluid has long been known. When a hydramnion corrects itself it is to be attributed to the child's drinking more of the liquor amnii than is produced. A decrease in the amount of fluid may be attained by sweetening the liquid content of the amniotic sac with 80 c.cm. of a solution of 50 saccharin tablets intra-amnially. This results on occasion in the reduction of a hydramnion. The saccharin may be discerned in the blood of the umbilical cord and in the urine of the child, and, further, it may be demonstrated in the urine of the mother. This proves the transference of the saccharin-containing amniotic fluid through the placenta to the mother's organism. An indirect proof that the artificially introduced saccharin traverses in turn the gastro-intestinal tract, the blood stream, and the kidney of the child, and is in part transferred through the placenta to the maternal organism could be adduced in a case of atresia of the esophagus. In this case hydramnios was present and the excess fluid did not disappear following sweetening with saccharin as the child was unable to drink.

In other cases tests were made using intra-amniotic injections of methylene blue, 50 c.cm. of water and 300 mgm. of methylene blue. In a short while the mother excreted blue-green colored urine. Since methylene blue cannot traverse the fetal membranes, the child must have drunk the colored amniotic fluid. The fluctuations in the excretion of the dye seem to indicate that the child does not drink continuously, considerable periods of drinking alternating with periods without drinking probably during sleep of the child in utero. The methylene-blue test may also be used to judge whether the child be living or dead, except in cases in which the child is unable to swallow, as in anencephalus or atresia of the esophagus.

In reference to hydramnion and uni-ovular twins the following additional conclusions were also made from these studies:

The child, in cases of hydramnios, drinks amniotic fluid with methylene blue, in large amounts, at least 1 liter per day. These large amounts are not excreted through the kidney of the child, as only traces of the dye could be demonstrated in the bladder urine. In the case of twins, the fluids from the one twin are not transferred to the second, as in the latter, no traces of methylene blue could be found. The question, "What becomes of the swallowed liquor amnii, in so far as it be not resorbed by the fetal body?" may be answered by the statement that the liquor amnii is either excreted through the amnion, back into the amniotic cavity, or passes over, through the placenta, to the mother's body. In the latter instance the loss of water is made good again by the first twin, in that its blood passes to the second and is replaced by fluid from the mother's circulation.

It seems now to have been established as a fact that the volume of amniotic fluid is determined by the functioning of the amniotic epithelium together with the amounts drunk by the child. Normally, nature maintains an equilibrium between the amounts produced and the amounts resorbed in the interest of the stability of the cephalic position of the child in utero, and of protecting the child and the umbilical cord from pressure.

(H. FUCHS). JOHN W. BRENNAN, M.D.

Gasparri, F.: A Clinicostatistical Study of Face Presentation (Della presentazione di faccia; contributo clinico-statistico). *Ginecologia*, Torino, 1937, 3: 837.

After having reviewed the literature on this subject, Gasparri presents a clinicostatistical report of cases of face presentation observed in his clinic over a period of ten years.

The author found that face presentation occurs in about 0.5 per cent of the cases. The most frequently observed presentations are right mento-posterior and left mento-anterior. Less frequent presentations are right mento-anterior and left mentoposterior.

In the majority of cases face presentation occurs spontaneously regardless of the position of the presenting part, but more frequently in anterior than posterior positions.

The duration of labor, as far as dilatation of the cervix and expulsion of the fetus are concerned, is longer than in vertex presentations, and this is true especially in primiparas.

Early rupture of the membranes occurs with a frequency of 31.33 per cent. The total duration of labor in these cases was found to be markedly prolonged. The average duration of labor was twenty-five hours and forty minutes, whereas in cases with late rupture of the membranes the average duration was twelve hours and forty-five minutes.

The duration of the third stage of labor was physiological in 97.9 per cent of the cases and the blood loss was in all cases within normal limits.

In 21 per cent of the cases, labor was terminated operatively. Forceps application was most commonly used, in 14.8 per cent. Embryotomy was performed in 4.2 per cent of the cases and version in only 2.1 per cent of the cases.

Vaginoperineal tears occurred relatively frequently, i.e., in 37 per cent of the cases, and com-

plete lacerations in 4.2 per cent. The maternal mortality was found to be inferior to the average mortality of face presentations (2.1 per cent), and puerperal infections were very rare (2.1 per cent).

The general fetal mortality was 17 per cent, but 3 cases were due to dead and macerated fetuses, 1 to spontaneous abortion at the sixth month, and 1 fetus was a monster. Hence the relative fetal mortality in the author's series was 10.6 per cent. The fetal morbidity, on the other hand, was very small (4.2 per cent).

The fetal mortality in relation to the various obstetrical operations was found to be high; forceps and embryotomy had a mortality of 55.5 per cent, but the mortality in versions was nil.

The high fetal mortality was due to pelvic malformations which, even though slight, rendered the extraction of the fetus exceedingly difficult if not impossible.

Because of the high fetal mortality following obstetrical interventions by the vaginal route, the author emphasizes the value of a cesarean section in the presence of any pelvic anomaly.

RICHARD E. SOMMA, M.D.

LABOR AND ITS COMPLICATIONS

Urnes, M. P., and Timmerman, H. J.: Breech Delivery. *J. Am. M. Ass.*, 1937, 109: 1616.

The fetal mortality of 346 breech presentations occurring in 336 patients delivered at home compares favorably with that in reports of recent hospital series.

Parasacral anesthesia for breech extractions is preferable to ether anesthesia, since in the series presented, the fetal mortality was slightly lower and the incidence of maternal complications definitely lower when it was used. It possesses the added advantage that its use does not require the presence of a skilled anesthetist in addition to the operator, and it may be used in cases of toxemia or pulmonary complications.

Pudendal block anesthesia is particularly adapted to spontaneous delivery with episiotomy and forceps to the aftercoming head. It produces no relaxation of the uterus, so that the serious complications of post-partum hemorrhage and manual removal of the placenta will not occur as frequently as with the use of ether. Contra-indications to the use of local anesthesia for extractions, or even for the simpler operations, are threatened rupture of the uterus, severe fetal asphyxia, and inflammatory lesions of the perineum.

CHARLES BARON, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Colebrook, L., Purdie, A. W., and Others: The Treatment of 106 Cases of Puerperal Fever with Sulphanilamide. *Lancet*, 1937, 233: 1237, 1291.

One hundred and six patients with puerperal sepsis were treated with sulphanilamide, administered usually by mouth alone. One hundred of them were infected with hemolytic streptococci, belonging to Group A Lancefield in 92 cases; 3 were infected with anaerobic streptococci, and 3 with staphylococci. The clinical course of the 100 cases infected with hemolytic streptococci was on the whole similar to that of the 64 cases previously treated by sulphamidochrysoidin and P.S., although resolution of the infective process seemed a little less spectacular. The average stay in the hospital was nineteen and seven-tenths days as compared with thirty-one and three-tenths days in 1935. There were 8 deaths among the 100 cases, but only 3 of them can be regarded as directly due to the sepsis; they occurred in patients who lived long enough for chemotherapy to have a fair trial.

The mortality rate for all patients (199) infected with hemolytic streptococci since the beginning of 1936, when treatment with sulphamidochrysoidin and P.S. was begun, was 5.5 per cent as compared with the average of 22.8 per cent for the preceding five years. The significance of this change is discussed. "Drug fever" was suspected in several instances. Some degree of cyanosis developed in 58 cases and was usually associated with methemoglobinemia and sulphemoglobinemia. Other toxic manifestations of the drug observed much less frequently included prostration, paresthesia, headache, visual disturbances, and joint pains. No generalized rashes developed.

J. THORNWELL WITHERSPOON, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Rolnick, H. C.: Some Observations on the Renal Capsule. *J. Urol.*, 1937, 38: 421.

Rolnick states that the true capsule of the kidney acts as a protective barrier to trauma, and resists the spread of infection to the organ. There is a constant interchange of fluid on the kidney surface which may be of considerable clinical and physiological importance. This fluid lubricates the kidney, and allows for the constant finding of a plane of cleavage between the capsule and the kidney.

Rolnick believes that decapsulation is harmful to the kidney, for the new capsule which forms later consists of scar tissue only and contracts and compresses the kidney. These actions interfere with the changes in intrarenal tension and also prevent an interchange of fluid from its surface. Thus, decapsulation should not be done routinely at operations, as is practiced by some surgeons.

HENRY L. SANFORD, M.D.

Coutts, W. E., Banderas, T., and Cantin, F.: The Renal Syndrome Due to the Presence of 6 Lumbar Vertebræ (Contribution à l'étude des syndromes rénaux causés par l'existence de six vertèbres lumbaires). *J. d'urol. méd. et chir.*, 1937, 44: 467.

Coutts and his associates note that although much progress has been made in urological diagnosis in recent years, there are some clinical syndromes of lumbar pain due apparently to prerenal or pararenal conditions, the cause of which is still obscure. The kidneys are thoracico-abdominal organs and extraperitoneal; their normal mobility is slight, and their anatomical integrity depends upon intra-abdominal pressure and perhaps also upon the bony and muscular configuration of the body more than is the case with other organs.

In the last few years, the authors have observed 4 women in whom urological symptoms were associated with an anomaly of the lumbar vertebræ; in all these women there was a sixth lumbar vertebra present, as demonstrated by a careful roentgen study of the whole spinal column.

In relation to the bony framework, the kidneys are normally placed in the angle of the eleventh rib and the outer border of the spinal column; the crest of the ilium is below them. In general the kidneys lie at the level of the last dorsal and first two lumbar vertebræ; the right kidney is somewhat below the left kidney; and the kidneys in women are at a lower level than in men. The twelfth rib shows much variation; it may be entirely absent or very short. If the rib is long it extends in an oblique direction from the spine; if short, it extends horizontally. The eleventh rib shows very little variation.

If a supernumerary lumbar vertebra is interposed below the last dorsal vertebra, the upper part of the kidney is at the level of the second lumbar vertebra and the kidney appears to be displaced downward; it can also be palpated over a larger extent than normally. If the supernumerary lumbar vertebra is interposed between the last lumbar vertebra and the sacrum, the kidneys retain their normal relationship to the lumbar vertebræ, but the ureter is elongated. With the first type of vertebral anomaly the kidneys become abdominal rather than thoracico-abdominal organs.

In making roentgenograms of the bony structure of women with renal symptoms, the authors have measured four diameters forming a quadrilateral. These diameters are: (1) from the center of the upper border of the first lumbar vertebra to the center of the upper border of the first sacral vertebra, (2) from the center of the upper border of the first lumbar vertebra to the inferior posterior spine of the ilium, (3) from the superior posterior iliac spine to the center of the upper border of the first sacral vertebra, and (4) from the inferior posterior spine of the ilium to the center of the lower border of the twelfth rib if the rib is long, or to the distal extremity of the eleventh rib, if it is short. In the cases of 55 women with 5 lumbar vertebræ in which roentgenograms and measurements were made, 47 had a long twelfth rib and 8 a short twelfth rib. The diameters that were of the greatest interest in this study were found to be (1) and (2). In the 47 cases in which the twelfth rib was long, the diameter (1) was from 17 to 18 cm. in 75 per cent of the cases; the diameter (4) varied from 12 to 15 cm., being 14 cm. in 42.5 per cent of the cases. In the 8 cases with a short twelfth rib, the diameter (1) was 16 cm. in 50 per cent of the cases, and the diameter (4) was 13 cm. in the same percentage of cases. However, in 4 women with 6 lumbar vertebræ the diameter (1) was greater than 20 cm., from 20.8 to 26 cm., and the diameter (4) varied from 13.5 cm. to 17 cm.

In 2 of these 4 cases the interposition of the sixth lumbar vertebra was of the sacral type; both patients complained of attacks of lumbar pain, which in one was increased by movement. In these cases the symptoms must be attributed to the elongation of the ureter with the resultant tendency to relaxation and abnormal curvatures. In the other 2 cases the interposition of the supernumerary lumbar vertebra was of the "cranial type;" the kidneys were in the abdomen and easily palpable. In this type the symptoms are due to the low position of the kidneys, as they are deprived of their costal support and more exposed to injury.

ALICE M. MEYERS.

Cibert, J., and Klajman, H.: Carbuncle of the Kidney (L'anthrax du rein). *J. d'urol. méd. et chir.*, 1937, 44: 273, 353.

Carbuncle of the kidney is a rare variety of staphylococcic pyonephritis first described by Israel

of Berlin in 1891. It is to be distinguished from multiple cortical miliary abscesses and from solitary large abscess of the kidney. It is a well circumscribed lesion which projects from the surface of the kidney like a tumor. On section it presents a striking carbuncular appearance, showing numerous pockets of thick staphylococcic pus, in the midst of a more or less dense fibrous-like tissue. The authors' study is based on 3 cases of their own, plus 65 cases collected directly from the French and foreign literature. Others have reported larger series, so that a total of about 110 or 120 cases have been reported in the world literature. The authors included only cases in which they were able to read the original report and were convinced of the correct diagnosis.

Carbuncle of the kidney occurs as a metastatic involvement of the kidney in the course of staphylococcic septicemia or pyemia, although the original septicemia may have been mild or even unrecognized. The condition is apparently rare, occurs most commonly between the ages of twenty and forty years; it predominates in the male sex. It may occur as a distant complication of such conditions as furunculosis, carbuncle of the neck or elsewhere, simple abscess, tonsillitis, and infected wounds. Trauma to the kidney may be a predisposing factor.

Anatomically the lesion may be localized or it may be massive and occupy almost the entire kidney. It is usually single, but may be multiple in one or both kidneys. Of the 68 cases here reported 7, or 10.2 per cent, were bilateral. The perirenal tissues may be normal or there may be a perinephritic phlegmon, or even dense fibrosis in long-standing cases. Twelve of the 68 cases had other associated extrarenal metastatic complications, as pericarditis, parotiditis, osteomyelitis, and empyema. Carbuncle may be associated with perinephritic abscess.

Histologically, in the early stage, carbuncle of the kidney shows numerous small collections of neutrophilic leucocytes, surrounded by an area of edema, fibrosis, and granulation tissue. Later there develop 3 distinct zones: (1) a peripheral zone of renal tissue showing marked inflammatory reaction, with plasma cells and leucocytes in the enlarged convoluted tubules, in the interstitial tissue, and within Bowman's capsules; (2) a middle zone composed of fibrous tissue and capillaries, infiltrated with leucocytes; (3) a central zone of fibrous tissue poorly stained, with many staphylococci and remnants of glomeruli and tubules.

Clinically, the most typical case is that of a person who has recently had some type of staphylococcic infection who suddenly develops high fever, signs of toxemia, indefinite lumbar pain, and costolumbar tenderness. Fever persists, together with prostration. Only after some time does the kidney become enlarged and pus appear in the urine. The blood culture is rarely positive. Very often a perinephritic abscess appears. In occasional cases, the entire course of the disease is subacute or chronic.

The diagnosis is rather difficult. On the basis of the signs and symptoms just given it could be suspected. Ureteral catheterization with separation of urine from the two kidneys may be helpful. Pyelographic changes are present in about 85 per cent of the cases. If perinephritic abscess develops, this condition may cause the clinician to overlook the underlying carbuncle of the kidney.

Medical treatment consists of general supportive measures plus vaccine therapy, serotherapy, and staphylococcic antitoxin. Chemotherapy seems to be of no value. Although the other measures are of doubtful value, they may help in some cases, and because of the persistence of bacteriemia in some cases after operation, the authors advise that they be continued after surgical intervention.

Surgical treatment consists either of nephrectomy or of some more conservative procedure. In massive carbuncle, and in some other cases nephrectomy must be done. Forty-two cases in this series were treated by nephrectomy. The conservative procedures reported in this series are as follows:

1. Simple incision of perinephritic abscess with no direct attack on the carbuncle. Eight cases; among these there was 1 death; 7 nephrectomies were performed with 4 subsequent deaths.

2. Incision of the renal capsule and drainage in contact with the carbuncle. Two cases with no deaths.

3. Decapsulation, incision of the carbuncle with the thermocautery. Three cases, no deaths.

4. Excision, avulsion, or curettage. Eight cases with no deaths.

5. Resection. Four cases and no deaths.

6. Enucleation along a cleavage plane. Six cases with 1 death.

The results of nephrectomy were as follows: 34 immediate nephrectomies with 5 deaths, a mortality of 14.7 per cent and 8 secondary nephrectomies with 4 deaths, a mortality of 50 per cent, which makes a total of 42 with 9 deaths, and a total mortality of 22 per cent.

The results of conservative operation varied greatly as regards duration of convalescence, complications, and final result, but in general the mortality rate was lower than after nephrectomy, except in the cases of primary incision of perinephritic abscess followed by nephrectomy. The authors quote the mortality statistics of others, which are in general comparable to theirs. They conclude with careful résumés of their 3 cases, together with abstracts of the other 65 cases they have reviewed.

M. M. ZINNINGER, M.D.

Priestley, J. T., and Braasch, W. F.: The Late Results in the Conservative Management of Nephrolithiasis. *J. Am. M. Ass.*, 1937, 109: 1703.

In general, surgical treatment should be advised for primary calculi, unless they are so minute that they may pass spontaneously. The absence of pain or urgent symptoms is no excuse for advising against operation. If the stone is not removed, renal damage is progressive to a greater or less extent in the majority of cases and operation often ultimately

becomes imperative. If operation is postponed until this time, the chance for performing a conservative operation and preserving the kidney is certainly reduced. If for any reason a given stone is not removed soon after its presence is detected, the importance of careful periodic urological examination cannot be overestimated. Under close observation of this type of case it may be safe occasionally to treat certain patients with nephrolithiasis medically. Changes in the size of the stone, the pyelographic observations, renal function, and other important factors can then be detected early and the proper treatment can be instituted before the kidney has been damaged too severely. Excretory urography will usually supply the pertinent data in such cases.

Although many of the patients who had large, bilateral branched calculi survived some years without evidence of serious difficulty, in almost every case grave symptoms developed sooner or later, and very few of them were living ten years after the stones were first discovered. In some cases small calculi associated with large branched stones became dislodged and occluded the ureter. Damage to the renal parenchyma was progressive, so that ultimately the renal reserve was greatly depleted and operation or any intercurrent excessive demand on renal function carried a very high risk. Destruction of the kidneys was often slow and during the ensuing years the patient may have enjoyed comparative comfort while resting under a sense of false security. The authors do not mean to imply that every patient with bilateral branched stones should at once be operated on; however, the general policy of early conservative operation certainly seems advisable in most cases, as the ultimate prognosis is bad if the stones are not removed. With the current improvements in surgical procedures and postoperative treatment the risk of operation in cases of this type has been definitely reduced and the chance of preserving a functioning kidney correspondingly enhanced. Obviously, if operation is to be performed, the optimal time is prior to the development of renal insufficiency.

One is often asked by the patient who has a renal stone that has caused few if any symptoms, "What are the chances for future trouble if the stone is not removed?" Although there are, of course, no absolute criteria by which this question can be answered, certain factors are of importance in attempting to estimate the likelihood of subsequent symptoms. The more important factors in this regard are, as has been said, the history of pain, whether the stones are unilateral or bilateral, whether or not they are recurrent, the size and position of the stone or stones within the kidney, the pyelographic appearances, the function of the kidney in question, and the amount and nature of the infection present. In general, the stones which are least likely to cause trouble are small (1 cm. or less), have not previously caused pain, and are situated in a calyx of a normally functioning uninfected kidney which shows no pyelographic abnormality. In contrast, stones which in all probability will cause definite trouble are those which have already caused pain, are larger than 1 cm. in diameter, and are situated in the pelvis of an already damaged and infected kidney. With these factors in mind, the advice regarding the advisability of early operation may be influenced accordingly.

One hundred and seventy-seven patients who had nephrolithiasis but who were not operated on at the time diagnosis was established were followed for an average of eleven years to determine their subsequent clinical course.

It was noted that: (1) 81.8 per cent of all unilateral stones and 97.8 per cent of all bilateral stones that were not removed surgically caused further symptoms referable to the urinary tract, (2) "silent" stones caused subsequent symptoms less frequently (in 66⅔ per cent of the cases) than stones which had previously caused pain (in 96.6 per cent of the cases), (3) large stones caused subsequent symptoms and necessitated later operation more frequently than small stones, (4) stones in a calyx caused subsequent trouble less often than stones in the pelvis, and this was true especially of stones in the tip of a calyx, (5) a kidney which contained a stone but which was normal pyelographically caused serious symptoms less frequently than a kidney which was definitely abnormal pyelographically, (6) impairment of renal function increased the likelihood of serious symptoms and the necessity for subsequent operation, and (7) the presence of gross infection in association with stone definitely increased the incidence of subsequent symptoms referable to the kidney.

Bailey, O. T., and Harrison, I. H.: Large Benign Renal Neoplasms: Their Pathology and Clinical Behavior, with a Report of 5 Cases. *J. Urol.*, 1937, 38: 509.

The authors present the case histories and local pathological findings in 5 cases of benign tumor of the kidney. The majority of the symptoms are caused by the pressure of the mass on adjacent viscera. Hematuria was the primary symptom in 2 cases. Roentgenographic studies were of primary importance in the differential diagnosis from malignancy, enlarged spleen, retroperitoneal neoplasms, hydronephrosis or pyonephrosis, and cysts of the mesentery, ovary, or pancreas.

The operations were performed by the transperitoneal method. DONALD K. HIBBS, M.D.

Patch, F. S.: Three Unusual Primary Kidney Tumors. *Brit. J. Urol.*, 1937, 9: 339.

The author reports 3 very interesting cases of kidney tumor. The first was a carcinoma in a crossed heterolateral ectopic kidney without fusion. The pre-operative diagnosis of this condition was exceptionally rare prior to 1908. In his discussion of the cause of this anomaly, the author refers to Pagel, who states, "These are almost without exception limited to parts derived from the Wolffian and Mullerian ducts." He advances the view that a crossed ectopia arises through the budding of one ureter toward the wrong side, and that the ureter

as a result of this, or because of a hypoplasia of its proper renal mass, finds a junction with the opposite one. The degree of fusion, when it occurs, is very variable, and between complete fusion and complete separation into two isolated kidneys, all degrees of transition are found. One may assume that the renal blastema of the one side is divided into two kidneys, each with its ureter. This theory would explain the almost constant hypoplasia of the crossed ectopic kidney, in that it has available only a portion of the nephrogenic cap on the side with which the ureter has made a junction.

In discussing the second case, a malignant leiomyoma, the author says that it is fair to assume that some of the primary tumors of the kidney that have been described as fibrosarcomas are not tumors that have arisen from fibroblastic cells, but from smooth muscle cells, and they are really leiomyomas.

The differentiated cells in this malignant leiomyoma are spindle-shaped and resemble cells of fibroblastic origin, and the tumors would have been called fibrosarcomas if the material had not been properly fixed and stained with differential stains. As a result of proper fixation of the fresh material and the use of differential stains, we have been able to demonstrate myoglia fibrils within the cells of this tumor, a finer histological structure than is found in smooth muscle cells.

In going over a comparatively large series of tumors removed in the Montreal General Hospital, the author was impressed with the fact that a fair percentage of the tumors that under ordinary circumstances would have been diagnosed as fibromas or fibrosarcomas, when properly fixed and carefully studied, were found to be smooth muscle tumors.

The third case was a malignant papilloma growing in an old hydronephrotic sac. The author states that in this case the hydronephrosis was caused by a kinked and tortuous ureter close to the renal pelvis and was apparently due to a periureteritis in one of the loculi of the hydronephrotic sacs, where the tumor had taken origin. J. SYDNEY RITTER, M.D.

Heitz-Boyer: Surgical Drainage of the Kidney, Transrenal Inferior Longitudinal or Inferior-Pole Drainage (Drainage chirurgical du rein, le drainage transrénal longitudinal inférieur ou polaire inférieur). *Mém. l'Acad. de chir.*, Par., 1937, 63: 1102.

The following four main considerations should be met in surgical drainage of the kidney:

1. Removal of the urine secreted by the kidney at the most dependent point.

2. The escape of clots, debris from calculi, and purulent material.

3. Assurance that the cavities of the kidney remain empty and, if infected, intrarenal lavage with antiseptic solutions.

4. Maximum comfort to the patient and easy change of dressings.

The author believes that his technique, which he calls transrenal, inferior longitudinal drainage or lower-pole drainage, meets all these requirements. The accompanying illustration (Figure 1) shows diagrammatically how the drain is placed. The technique is simple. It implies previous pyelotomy for the removal of calculus, or for partial resection of the pelvis. Through the pyelotomy incision a curved clamp is introduced into the lower calyx and its point pushed down into the lowermost part. From there two techniques are possible:

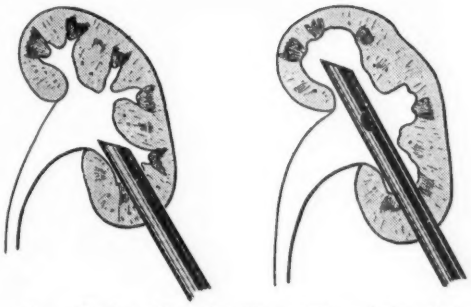

Fig. 1. The two different positions of the end of the drain inside the kidney. On the left, the intrarenal cavities being only moderately dilated, the drain is inserted only into the pelvis; on the right, the superior calyx being quite dilated, the end of the drain is drawn up into it, in order to better evacuate and disinfect it.

1. A clamp with blades closed is inserted through the renal tissue from outside the lower pole, until the tips of the two clamps meet. The two blades of the outer clamp are then spread, creating a tear in the renal tissue, which bleeds very little. The drain is then inserted through this defect.

2. The defect in the renal tissue can be made with an electric knife, the clamp inside the lower calyx serving to guide the direction of incision. A tunnel is made in this way, and bleeding is controlled by electrocoagulation. The drain inserted from without is pulled into the pelvis by the clamp inside. Any rigid or semi-rigid rubber tube may be used. although the author makes use of a special model which he has had made. The end should be cut diagonally and an eye should be cut at a lower level. The size of the tube should vary and depend on the size of the pelvis and calyces, which can be determined by previous pyelography. Usually 25, 30, or 35 F is used. The upper extremity of the drain may be placed in the lowermost calyx or may be carried up into the superior calyx with an eye in the tube in the lower calyx. After the drain is precisely placed it is immediately fixed at its point of emergence from the lower pole by a catgut suture in the capsule, also to the lips of the cutaneomuscular incision so that in the postoperative phase there is no danger of the tube's being pulled out of the kidney. The pyelotomy incision is then closed.

This method of drainage is indicated in most cases of nephrostomy for almost any cause, but is especially desirable in cases of conservative surgery for in-

fected calculi, and large hydronephroses. It insures adequate drainage, allows lavage of the pelvis, prevents urinary leakage through the wound, and can be kept in position for a considerable period, up to forty or fifty days. By pyelography through the tube, complete healing of the pyelotomy incision can be determined. It is often combined with the use of an indwelling ureteral catheter so that lavage can be made from either the large tube in the inferior pole or through the ureteral catheter.

It is particularly adapted to the author's conservative operation for large hydronephrosis. This operation consists of partial excision of the enlarged pelvis, freeing of kinks in the ureter if present, elevation and suspension of the kidney with rotation so that the kidney occupies a more or less horizontal plane with the ureter and leaves the pelvis at the most dependent point. The lower-pole drainage is instituted and the pelvis closed. A number of pyelographic studies before and after this operation are reproduced which show remarkable improvement in the size and shape of the calyces, and bear out the author's contention that this form of conservative surgery of the kidney is well worth while.

M. M. ZINNINGER, M.D.

GENITAL ORGANS

Uhle, C. A. W., and Melvin, P. D.: Tertiary Prostatic Hypertrophy. *J. Urol.*, 1937, 38: 487.

The authors present a case of tertiary prostatic hypertrophy. The patient had undergone the following diagnoses and procedures:

December, 1925. Large adenomatous trilobar prostatic hypertrophy and vesical calculus. Two-stage suprapubic prostatectomy and lithotomy.

December, 1930. Inflammatory contracture of the vesical sphincter and suprapubic fistula. Young's punch operation and excision of the fistula.

June, 1932. Large adenomatous trilobar prostatic hypertrophy and suprapubic fistula. One-stage suprapubic prostatectomy and excision of the fistula.

May, 1935. Moderate adenomatous bilateral lobe prostatic hypertrophy predominately in the right lobe and suprapubic fistula. Excision of fistula and transurethral resection. All microscopic sections showed benign prostatic hypertrophy.

The authors reviewed the literature and found the incidence of recurrence to be between 1 and 2 per cent. They ascribe recurrence to the patient who is operated upon at a comparatively early age. The adenomatous tissue is removed, but prostatic tissue is left from which further adenomas develop.

GILBERT J. THOMAS, M.D.

Barney, J. D.: Transurethral Prostatic Resection Versus Prostatectomy. *New England J. M.*, 1937, 217: 1073.

The author discusses transurethral prostatic resection versus prostatectomy, presenting data obtained from the Massachusetts General Hospital, on the treatment of prostatism during the past twenty-five years under his supervision.

During 1932, 60 cases were operated upon transurethrally, with rather unsatisfactory results, and the author admits that these results were due to lack of familiarity with the procedure.

Since 1933, about 200 cases were operated upon by the transurethral route with a mortality of 3.8 per cent. Though this procedure is employed in about 60 per cent of all patients operated upon for prostatism, he does not advocate its use as a prophylactic measure.

There has been a steady increase in the percentage of transurethral prostatic resections as the author and his associates have perfected themselves in the employment of this procedure. He advocates inhalation anesthesia. The mortality rate was 12.3 per cent following perineal prostatectomy, 15.2 per cent after one-stage prostatectomy, and 17.8 per cent after two-stage prostatectomy.

The author comments on the possibility of leaving portions of a carcinomatous prostate in the patient, whereas prostatectomy would have removed the entire malignancy, and reports cancer to have been present in 21 per cent of the resected specimens.

He also warns that a second resection may be necessary later on.

The author further states that he does not wish it to be understood that he is condemning transurethral prostatic resection, but wants to make it clear that this is a procedure to be undertaken only by those who are competent to perform it and are aware of its dangers. Neither the perineal nor the suprapubic operation are in the discard, but here is still another and a very satisfactory method of relieving prostatic obstruction.

J. SYDNEY RITTER, M.D.

Surraco, L. A.: Considerations of Epididymectomy for Genital Bacillosus (Considérations sur l'épididymectomie pour bacillose génitale). *J. d'urol. méd. et chir.*, 1937, 44: 311.

In removing the epididymis for bacillary infections great care is necessary to avoid trauma to the testis, to the cord, and to the vascular supply to these structures. The head and tail of the epididymis are in direct continuity with the tunica albuginea, but the body is separated by the vaginal recess of Poirier. The chief danger to the blood supply is in the region of the hilum of the testis which lies under the body of the epididymis. The author describes his operation of epididymectomy as follows:

A longitudinal incision through the scrotal skin is used, unless there is an external fistula, in which case a racquet-shaped incision including the sinus opening is used. The scrotal contents are then delivered by continuing the incision more deeply into the region of the infradartol connective tissue. The incision is then continued through the vaginal membrane into the serous cavity. This may be partly obliterated, but usually some fluid-containing pockets representing its remnants can be found and opened.

The adhesions around the epididymis are then freed. The dissection of the epididymis from the testicle is then started, not at the head or tail, but in the middle of the body. The vaginal recess of Poirier is identified, and while the assistant exerts traction on the cord to hold the vessels out of the way, the points of a pair of straight Mayo scissors are inserted into this recess, kept close to the epididymis, and forced through into a cleavage plane in the spermatic cord. Two catgut ligatures are now passed around the body of the epididymis on each side and the epididymis is divided with the electrocautery or thermal cautery between the ligatures and the cut ends are carefully cauterized. This separation of the epididymis into two portions exposes the vascular supply to the testis, the epididymis and the structures of the cord. This vascular supply with its various abnormalities is described in detail. The maneuver described is said to give excellent exposure so that the branches going to the two parts of the epididymis can be seen easily and ligated without damage to any other vessels. Each half of the epididymis is then separately dissected from the testicle, the vas divided very high, usually near the internal inguinal ring, and finally the scrotal ligament is divided. The wound is closed completely by two rows of sutures without drainage.

M. M. ZINNINGER, M.D.

Dahl-Iversen, E., and Starup, U.: The Treatment of Undescended Testicle with Gonadotropic Hormone (Die Behandlung der Retentio testis mit gonadotropem Hormon). Hosp.-Tid., 1937, p. 657.

A summary of the results of the hormone treatment of undescended testicle is presented according to the published reports submitted by 19 authors. In all, 265 patients were treated. In 208 cases exact statements were made as to the results obtained: in 129 cases (63 per cent) there was complete descent and associated development of the testicle; in 25 cases (12 per cent) improvement was noted, that is, a partial descent with development of the testis; in the remaining 54 cases, the results were designated as poor as the testicles remained in their abnormal position. In the last group of cases some of the patients were comparatively advanced in age, from twenty to thirty years, and others had been operated upon previously without success. The age of from twelve to fifteen years is said to be most suitable for this treatment.

The following hormone preparations were employed: (1) those obtained from the urine of pregnancy, pregnyl (organol), follutein, antuitrin; (2) hypophyseal preparations, prehormone, prephyson and autex; (3) tablets or suppositories of prepitan, a dried hypophyseal substance; and (4) testicular preparations, testosan forte and androstin. No appreciable difference could be found between the results obtained with preparations made from the urine of pregnancy and those obtained from preparations made from the hypophysis. The testicular preparations were more effective when administered by injection than when given by mouth. A certain danger in the hormone treatment of undescended testicle is the premature development of secondary sex characteristics in boys otherwise normal in their physical development. Probably treatment should not be recommended before the beginning of puberty.

Hormone treatment is contra-indicated when there is a true ectopy of the testicle, when hernia and hydrocele are present, or when fixation of the testicles has occurred, and, finally, when malignancy is suspected.

If hormone treatment fails, operation seems to be indicated. After the operation, hormone treatment may be resumed to promote development of the testicle.

The authors report their own experiences with hormone therapy. They employed preferably a luteinizing hormone, expecting from this hormone an especially favorable effect upon the Leydig cells, which are believed to play the most important part in the descent of the testicles.

(HAAGEN). J. M. SALMON, M.D.

FRACTURES OF THE WRIST

Five-Year Review of the Literature, from 1932 to 1936

JAMES K. STACK, M.D., Chicago, Illinois

ONE of the most common injuries to the skeletal structure continues to be the fracture of the distal end of the radius, which may or may not be complicated by lines of comminution entering the distal radio-carpal joint. Displacement of the styloid process of the ulna is not an unusual associated injury. When the patient falls on the outstretched hand, the intensity of the force thus applied is the determining factor from which a simple type of Colles' fracture or one with marked joint comminution will occur. Ghormley and Mroz (38) and Steindler (130) were among the few who wrote on this subject. Probably only a few articles were written because the lesion is easily recognized as a rule and the treatment is rather standardized.

Certain features about these fractures which are worthy of note are stressed by the authors. On examination of the wrist and the roentgenogram of a patient suffering from this type of injury 6 points must be kept in mind:

1. Does the fracture enter the wrist joint proper? If it does, the prognosis should be somewhat more guarded than if it does not enter the joint, because injury to the joint cartilage will make the patient a more likely subject for the development of a traumatic arthritis than a patient whose joint is clear.

2. Has the distal radio-ulnar joint been disturbed? If it has, the prognosis should again be more guarded because the patient's ability to pronate and supinate completely will be of longer standing than usual.

3. The dorsal displacement of the distal fragment. This displacement is responsible for the typical silver-fork deformity and must be reduced if a good cosmetic result is to be obtained.

4. Dorsal tilt of the distal radio-articular surface. Since this surface normally tends to face the volar aspect of the wrist to a very slight degree, any marked dorsal tilt will produce a subsequent limitation of volar flexion in the wrist.

5. Shortening of the radius. As the distal end of the radius is made up of cancellous bone, it is particularly susceptible, especially in older people, to impaction and shortening. Normally the distal end of the radius, which is palpated at the base of the anatomical snuff-box, is about a quarter of an inch longer than the styloid process of the ulna. This is a good landmark for determining whether normal length has been reëstablished in the reduction. If it has not and the radius is allowed to remain in this shortened position, radial deviation of the hand will occur and undue prominence will be given to the lower end of the ulna. While a small degree of this deformity will not greatly affect the function of the hand, its appearance may be a source of some embarrassment to the surgeon.

6. Dysalinement in rotation of the distal fragment. This seldom occurs to a marked degree, and is probably the least important of this group of findings. It is easily seen that any great disparity in the rotation of the fragments will result in the patient's inability to perform the rotatory movements of the forearm completely.

In the literature there is noted a marked tendency toward a shorter period of absolute immobilization after these fractures. This is valuable particularly in cases of older patients and in cases in which there is noticeable damage to the contiguous soft tissues. Early removal of the plaster or early passive motion must not be allowed without great care, because in the absence of bony healing some degree of recurrence is possible. It is to be remembered that the position of function of the hand is in slight dorsiflexion and if, after reduction of the fracture, the hand is held in a position of volar flexion for too long a period, its usefulness will be notably impaired. Solid union is not necessary before early motion, but it is necessary before the patient is allowed to get about without a protective splint.

For the old malunited fracture in which dorsal displacement of the distal fragment, marked shortening of the radius, or a dorsal tilt of the articular surface has been allowed to remain, operative intervention has been advised (32). The fundamental principle of all the operative procedures suggested is the correction of the two disturbed planes, the volar-dorsal plane and the radio-ulnar plane. This is accomplished by means of an osteotomy and a wedge-shaped graft taken

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either from the lower end of the radial shaft or from the crest of the tibia. (Campbell has recently suggested that this graft be taken from the prominence of the distal end of the ulna. This, in itself, will tend to improve the cosmetic result.) Authors are agreed that solid bony healing should be present before the osteotomy is attempted. This will decrease the danger of fragmentation of the distal portion of the radius by the osteotome and the subsequent prying that may be necessary to restore the radius to its normal length. However, not all cases of malunion need be subjected to this open correction, as a noticeable deformity does not necessarily mean poor function. Persistent pain, marked limitation of motion, and extreme weakness of the grip, coupled with poor appearance, will justify further surgical efforts.

These afore-mentioned lesions of the lower end of the radius and ulna are common, expected, and, as a rule, recognized and treated satisfactorily. Only slightly less common and frequently unrecognized, and therefore poorly treated, is the group of fractures, dislocations, and diseases with a traumatic background which occur in the carpus, particularly in the proximal row. They continue to be a frequent source of disability in the wrist and their diagnosis, prognosis, and management are the subject of many papers and discussions.

CONGENITAL ANOMALIES

No case of congenital absence of any of the carpal bones was brought to the attention of the profession by writers during this five-year period. Frequently, however, the bipartite carpal scaphoid was discussed. Mouchet (85), Bergerhoff (7), and Watkins (144) call attention to the fact that this anomaly occurs frequently enough to confuse the issue when there is a history of atypical trauma or lack of the usual physical findings on examination of the wrist. This natural division of the bone is due to the presence of two ossification centers instead of the usual one, and the subsequent failure of fusion is made possible by the presence of the true articular cartilaginous plate between the two fragments. The opposite wrist should always be studied with the roentgen rays because frequently these lesions are bilateral. A sprain of the wrist with effusion of joint fluid or blood in the radiocarpal joint can confuse the issue in the presence of congenital division of this bone. A careful study, however, will easily enable one to distinguish between the fresh fracture and the long existing congenital separation. The principle thing to keep in mind is that the bipartite scaphoid will be smooth and even along the edge in question, while the fracture will be less smooth and, as time goes on, will usually show a slight increase of the space from absorption before ultimate healing takes place.

This same congenital condition may possibly exist also in the semilunar bone because it, too, at times has two centers of ossification. The remaining five bones of the carpus have not been mentioned in any of the articles concerning the possibility of confusion because of this particular condition. Watkins (145) names and discusses the dozen or so small anomalous bones which may appear in x-ray examination of the wrist. They may be present anywhere between the distal end of the radius and the ulna and the proximal end of the metacarpals. Usually they are closely associated with the normal bones, and a knowledge of their whereabouts together with a close study of their roentgenographic appearance will enable one to differentiate them from the small avulsion fracture which may occur in these areas.

Practically all the eight bones of the carpus have been the subject of reports of injury or disease, but the two important bones continue to be those on the radial side of the proximal row, namely, the naviculare or scaphoid, and the lunatum, or semilunar. These continue to lead all others, both as to frequency of injury, and duration and extent of disability following injury.

FRACTURES OF THE CARPAL SCAPHOID (NAVICULARE)

The mechanism of injury was mentioned only in passing by some of the authors, as it is well known that fracture of the scaphoid occurs by a fall on the outstretched dorsiflexed hand. Minor variations in this principal position are responsible for the occurrence of the other common injuries about the wrist, namely, fracture of the distal end of the radius, epiphyseal separation, and dislocation of the semilunar bone. No mention was found of fracture of the scaphoid occurring with a radial fracture, but fracture of the scaphoid is not uncommonly associated with dislocation of the semilunar bone. Thompson's (135) article includes a report of a fracture of the scaphoid bone associated with one of the cuneiform (triquetrum). More than one author suggest that ulnar deviation is the practical position in which to place the hand when falling. Even after a moment's reaction, this is a likely position to assume. This position makes it possible for the carpal scaphoid to attempt to be included as a member of both rows of the carpus and, being the longest bone in the group, it is best able to do this. It is thus set in this position a moment before the impact and

the tension plus the applied force causes the fracture to occur commonly at its midportion. That a definite fracture can occur spontaneously is suggested by Feutelais (36). Belot (6) cites an unusual instance of necrosis and fracture which occurred following repeated traumatisms, each of an intensity probably insufficient to be responsible alone.

While no exact figures are available in the literature over this period, the incidence in males shows a marked preponderance. It is only occasionally that attention is called to the fracture in a female. Working and laboring men are particularly subject to this injury and, even more important, it is in their wrists that the later serious complications are most often found. Hopkins (52) gives the interesting observation that in a group of 500 athletes observed during a twelve-year period, this fracture was more common than any other, including even fractures of the phalanges. No fracture of this type was reported in a child during this five-year period, and since 1908, when the first such case was reported, this fracture continues to be a traumatic rarity in childhood and adolescence. Gillies (40) reviews the common fractures that occur during this period of life.

Diagnosis. The clinical diagnosis of fracture of the scaphoid is mentioned frequently as it relates to both fresh and old cases. The differences between the features presented by these two types of cases are stressed. The patient with the fresh fracture presents an acutely painful wrist, and it is most important for the attending surgeon to have all the possibilities in mind. The common error made by the patient or the doctor, from which the majority of the chronic cases are derived, is to look upon the injury as a sprained wrist without the benefit of proper x-ray examination (14.) This leads to the fracture's being overlooked, to no treatment or certainly inadequate immobilization, and, in many instances, to nonunion. Speed (127, 128) calls attention to the swelling, which may partially or completely obliterate the anatomical snuff-box, the normal depression on the radial side of the carpus bounded by the long flexor and the long abductor of the thumb. At this site is found the point of maximum tenderness. No deformity is seen, and usually it is the pain and not mechanical obstruction which may cause varying degrees of limitation of motion in the wrist joint. The patient, of course, has usually volunteered the story of a fall on the outstretched hand.

In the old chronic type of case, pain is the constant symptom, although occasionally the patient will complain of the grating sensation, particularly on forced movements in the extreme ranges of motion. This pain is usually spoken of as "rheumatic" and dull in type. It is occasionally referred to the thumb or upward into the forearm and arm. Usually the pain is not constant and there are varying periods of time during which little or no pain will be felt. In the older cases, limitation of motion will be found on examination and this is usually based on the degree of traumatic arthritis that is present in the radiocarpal joint. Non-union itself may exist for many years, and in the event that the two fragments remain viable little change will take place in the contiguous cartilaginous surfaces (87). This situation is found to exist in the wrists of those patients who are not required to do manual labor. One cannot, however, prognosticate what degree of necrosis, cystic degeneration, or traumatic arthritis will occur in any of these cases, regardless of the amount of use to which the wrist is put.

X-Ray Diagnosis. Jacobsen (55), Preiss (109), Torphy (136), Warfield (143), Schnek (121), and Peter (105) discuss at length the roentgen diagnosis of this injury. The gist of their writings is that in examining the wrist with the thought of a possible fracture of the scaphoid, one must bear in mind that the ordinary anteroposterior and lateral views, such as are usually taken for a Colles fracture, may be inadequate for close scrutiny of the carpal bones, particularly the scaphoid. The fresh fracture of this bone is many times only a fine line with no displacement. It is usual for this fissure to become slightly widened later by the absorption of the bone cells along the fractured surfaces. Early in the treatment such an occurrence is not necessarily an indication of the development of non-union. Invariably, authors writing on the subject of the x-ray study of the wrist advise that additional angles be used, and that pictures taken in semi-pronation and semi-supination are of great benefit in the determination of the presence of these difficult fractures (15). Ulnar deviation is also advised because this brings the scaphoid to its full length and does not permit its distal portion to be superimposed by the rays on the proximal portion (Fig. 1). The work of Destot on injuries of the wrist remains a classic, especially in this aspect of the diagnosis.

It is agreed that the altogether too common error in the diagnosis of this lesion is one of omission rather than commission. If the possibility of the fracture is considered and the proper roentgenograms are taken, the fracture is not likely to be overlooked. In the neglected case which has gone

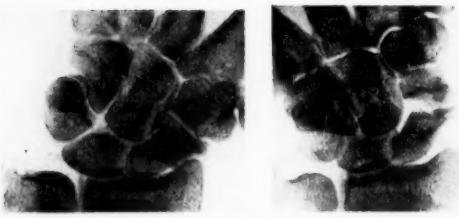

Fig. 1. Variation in x-ray appearance of scaphoid caused by change in position of wrist. Ulnar deviation brings it into full view. (H. Luetzeler: Deutsche Ztschr. f. Chir., 1932, 7: 450.)

on to non-union, the width of the fracture line may be visible even in improperly taken roentgenograms, and in those cases in which non-union has existed for years, with distortion in the shape of the bone and abnormality in size due to necrosis, it is, of course, obvious that injury or disease is present. In such cases it may not be easy to assign the cause definitely to a former fracture because the overgrowth of new bone replacing the necrotic bone may have obliterated the line, or may have united one or the other fragment to contiguous bones in the carpus. It is the common opinion, however, that post-traumatic degeneration without a fracture is much less common in the scaphoid than in the semilunar, and in the majority of cases the fracture can be found either on x-ray or operative examination.

Pathology. Since the publication of the work of Preisser and Kienboeck in 1910 on the post-traumatic degeneration of the scaphoid and semilunar, respectively, interest has been aroused in the pathological changes occurring in these bones as the result of a single fracture or multiple small injuries (18, 12). In the ordinary fracture of the scaphoid, seen early and treated properly, only the minimum change, similar to that seen in any other intra-articular fracture, takes place. This consists of a mixture of blood and synovial fluid about the fracture surfaces and a variable degree of tearing of the associated soft tissues. Usually, the amount of displacement is not great, and a fine fissure may be the only roentgenological evidence of the lesion. Commonly this fracture line widens during the first few weeks following the injury, because of some absorption of the bared surface. This is followed by an uneventful union in the majority of the treated cases. This does not imply that the cartilage surface will heal as readily, nor that the bone will not be subject to degenerative changes at a later date (Preisser) (Fig. II). The interposition of soft tissue is not ordinarily a factor in non-union because there is

Fig. 2. Cystic degeneration of semilunar (Kienboeck) and scaphoid (Preisser).

not sufficient laxity in these parts. Interference with the blood supply of the bone is frequently spoken of, but it is likely that the constant movement of the fragments when proper immobilization has not been used is the most important factor in the failure to heal. The various theories as to the cause of necrosis and cystic degeneration will be discussed later under the heading of Kienboeck's disease of the semilunar, which it closely resembles. The studies of Luetzeler (72) on the pathology of scaphoid non-union, in which he stresses the importance of blood supply and ligamentous attachments, are worthy of note to those interested in this subject.

Treatment. Boehler (9) has called attention to the fact that the treatment of this fracture need not be looked upon as nearly hopeless, as has been done in the past. He cites the astounding number of 154 cases in which the fracture united without incident. Because of the gloomy prognosis that has been associated with this injury over a period of time, there have been advocates of such radical treatment as primary excision of both fragments. In the literature of the past five years we find this mentioned, but never recommended, and it is safe to say that this radical method of treatment should be reserved for those cases in which conservative measures have failed.

Treatment of the Fresh Fracture. There seems little doubt that early and prolonged immobilization is the method of choice in the treatment of this injury. We find some difference of opinion, however, as to the method of immobilization, the position of the wrist during this period, and the time necessary for healing to take place. A circu-

lar plaster cast extending from the upper third of the forearm to the base of the fingers seems to be the method of choice. There are those who advise the straight or neutral position of the wrist, but most of the authors advocate a cock-up position. Some believe that moderate ulnar deviation should be included, while there are others who say that radial deviation will bring the two fragments of the fractured bone in closer approximation. All advocate that movement of the first metacarpal should be absolutely confined and some would go farther and include the proximal phalanx of the thumb. These positions are all advocated on the basis of success in their use, but no series of cases was found where one position had been pitted against another in actual trial. It is well agreed that the time of immobilization should be eight weeks or more, and that earlier motion will endanger the delicate union and lead to a re-separation of the fragments and their failure to unite. It is problematical how long after the fracture has occurred this conservative treatment can be instituted with a fair hope of union.

When definite failure has occurred following proper immobilization, the simplest surgical procedure designed to produce a union is drilling of the fragments (122). After preliminary exposure of the distal fragment in the region of the tuberosity a fine drill is introduced. Then, under fluoroscopic control, it is guided through the distal and into the proximal fragment, care being taken not to carry it far enough to injure the cartilage on the articular surface of the radius. One or more such drill holes may be made. Following closure of the small skin wound, the wrist is placed in the usual position for a period of about eight weeks.

The inlay method of bone grafting of this bone (89) is accomplished in much the same fashion. Following the exposure and the drilling with a 5/16 in. drill a sliver of bone of sufficient size to fit snugly into the hole is taken from the crest of the tibia and driven into the two fragments. The immobilization referred to previously is used.

The onlay bone graft (13) may also be indicated in old ununited cases in which no high degree of traumatic arthritis is present. It is accomplished by exposing the dorsal surface of both fragments and cutting a slot in each. A wedge-shaped graft taken from the dorsal surface of the distal end of the radius or from the tibia, is then inserted as in the inlay method. The same type of immobilization is used.

As to the question of excision as a treatment of this condition, we have those who advocate the removal of one fragment, usually the proximal, or both. It is generally conceded, however, that this method should be reserved for those cases in which conservative treatment has failed and in which a painful and disabling wrist continues to be present. The greatest number of cases needing extirpation, however, will fall into the group with long-standing non-union, together with an advanced traumatic arthritis in the radiocarpal joint. The inflammatory change may be so extensive as to have caused a union between one or the other fragment to other contiguous bones of the carpus, or to the distal end of the radius. Because of its articulation with the radius, the proximal fragment of the fractured scaphoid is more often the offender than the distal fragment, and some writers are of the opinion that excision of the proximal fragment alone is the best treatment. They contend that the remaining distal fragment will continue to support the radial side of the wrist, including the two multangulars and the first metacarpal bones, and in this way prevent, to some extent, the radial deviation that must necessarily occur when both fragments are removed. The consensus of opinion is that once excision is decided upon the operation should include the removal of both fragments.

The methods advocated for this operation are practically all variations of a dorsal and a dorsoradial incision. The tendons on the radial side of the wrist and the sensory branch of the radial nerve are carefully isolated and retracted. Next, the capsule of the wrist joint is incised. It is well to keep in mind at this time the possibility of error by mistaking the identity of the small bones that may be in the field. It is by no means impossible to remove a bone other than the scaphoid, particularly if it is densely adherent or united to one of the others. Since the trapezium (multangulum majus) is the one most frequently involved in such an error, it is best to locate definitely the distal articular surface of the radius, or the radial styloid. The dorsal aspect of the distal end of the radius at the radiocarpal joint overhangs somewhat because the plane of the joint has a slight volar inclination. After closure of the incision, immobilization only long enough to promote good healing and to control pain is advised. Motion is started as early as possible after this healing period has passed.

If the condition has been of long standing, the removal of this bone will do little toward bringing about any increase in the range of motion. Because there is free intercommunication between the joints of the carpus, a high degree of fibrosis has already taken place in the supporting soft

tissues, and this is the most important factor in the limitation of motion. Also, it is to be remembered in giving a prognosis of such a case that the removal of the entire scaphoid will most certainly produce a slight radial deviation of the hand, because of absence of normal support on that side.

CARPAL SEMILUNAR (LUNATUM)

In instances of acute trauma to the wrist joint the semilunar is rarely clinically fractured (41, 11, 101, 93), but it is often dislocated. Again the fall on the outstretched hand with the wrist dorsiflexed is responsible. When unaccompanied by other unjuries in the wrist, the dislocation practically always takes place toward the volar aspect, brings marked pressure to bear on the nearby soft structures, and, when long-standing, causes great damage to the tendons in the carpal tunnel and perhaps to the median nerve. No instance of a dislocation toward the dorsum was found in the literature of this five-year period. Apfelbach and Scuderi (3) report an instance in which the scaphoid was fractured and the semilunar dislocated, and all the fragments were displaced into the volar surface of the forearm (Fig. III).

Diagnosis. The clinical diagnosis of this dislocation is discussed by Conwell (18), Buxton (15), Dejardin and Bary (28), Dulta (33), and others, and all emphasize the two important features which this lesion presents: (1) the change which takes place in the contour of the volar surface of the wrist, whereby the normal concavity is lost and an indurated fullness is found in its place, and (2) marked limitation of flexion of the wrist. The latter is due to the actual mechanical blocking by the dislocated bone. After the lapse of a week or two there may be total absence of flexion. The impression obtained by these signs is corroborated by the roentgenogram. Warfield (143), Ernst and Roemmelt (35), stress the need for a good lateral view. It is in this view that the total or partial dislocation between the concavity of the distal articular surface of the semilunar and the convexity of the proximal surface of the os magnum (capitatum) is seen. In most instances the distal surface of the dislocated bone is found to be facing the volar surface of the wrist. In the anteroposterior view the dislocation when complete can be detected by the evident shifting of the bone toward the ulnar side of the wrist, but minor degrees of displacement can be easily overlooked.

Treatment. The treatment of a fractured semilunar is not frequently discussed because of the rarity of this type of fracture. Simple immobilization, with a guarded prognosis, is the treatment of choice in the early case, with excision reserved for a later time if the symptoms and changes in the bone make it necessary.

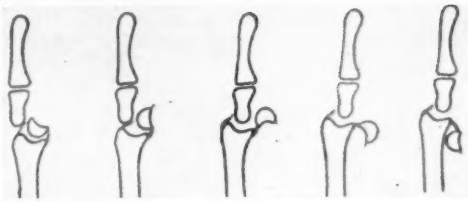

Fig. 3. The various degrees of rotation and displacement of the semilunar. (Boehler: Treatment of Fractures. Baltimore: Wm. Wood & Co., 1935.)

In the treatment of the dislocated semilunar, it is agreed by all writers of note that closed reduction is the method of choice if the case is seen reasonably soon after the accident. This reduction can be accomplished in one of two ways, either by traction alone as recommended by Boehler (9), or by traction plus manipulation, as done by Conwell (18).

The pressure of the volar ligament and the flexor tendons when strong traction is applied exerts a sufficient force to push the bone back into its proper position. This traction can be accomplished by grasping the hand or the fingers and exerting a slow gradual pull, while an assistant provides countertraction on the upper part of the forearm or arm. Skeletal traction may be necessary and, if so, can be accomplished by means of a pin passed through the second, third, fourth, and fifth metacarpals, with countertraction with an additional pin passed through the upper part of the ulna. If manipulation is used, the skin traction will usually suffice. The manipulating maneuver is used after preliminary stretching of the wrist. This manipulation consists of strong dorsiflexion to open further the space between the radius and the os magnum. This having been accomplished, the bone is forced back into place by pressure of the operator's thumb. By either method an audible or palpable click attests the replacement. The contour of the wrist returns to normal, and when gentle passive motion is attempted, the movement is free. In the absence of associated fracture, immobilization for a two-week period in a neutral position will suffice.

In the old cases, Boehler takes the extreme view that such a dislocation, however longstanding, can and should be openly reduced, but it seems to be the consensus of opinion that in the

old, neglected cases, or those which are irreducible, the bone should be removed (22). The longer the displacement has existed, the more deterioration will take place in the articular cartilage of the bone. Also, the normal space between the os magnum and the radius will be considerably diminished by the tendency of the os magnum to approach the radius. What little space may remain will usually become filled with fibrous tissue. It is emphasized that in any attempt to reduce openly the case of longstanding, skeletal traction and countertraction will be necessary. Sufficient space into which to replace the bone cannot be obtained by hand traction or manipulation. The use of skids with which to lever the dislocated bone back into its original position produces additional damage to the cartilage, which has already been somewhat devitalized by the interruption of the blood supply to the underlying bone. In addition, other cartilaginous surfaces may be damaged in this maneuver. It would seem that in the early case such instrumental leverage is not necessary, and in the old case such instrumental manipulation should be reduced to a minimum because excessive prying will not be necessary if proper traction has been applied and a thorough débridement of the space effected.

KIENBOECK'S DISEASE

Etiology. Because the opinion is prevalent that this condition has a definite traumatic background, numerous articles and reports are devoted to the subject. Fitte (37), Hulten (54), and Koestler (64) discuss the etiology of this condition at great length, while Gillies, quoting Riche, sums up the situation very well. He has placed the workers and writers on this subject into two schools of thought: (1) those who assume fracture to be the basis of the condition, and (2) those who do not. One of three factors may be responsible for the attitude of the first group: (1) local osteitis fibrosa in the region of the fracture; (2) defective regenerative ability of the carpus; and (3) aseptic primary bone necrosis, with a pathological fracture following. Those in the second group, who do not assume fracture to be the cause, give the following reasons for their belief: (1) injury to the blood vessels following a momentary dislocation spontaneously reduced; (2) abnormal pressure due to anatomical anomalies [Ringsted's contribution (113) tends to sustain the theory]; (3) degeneration; (4) infection; and (5) traumatic axone reflex, in which traumatic vasoconstriction first takes place followed by vasodilatation and subsequent bone absorption. The first group is represented by Wallenberg, Baum, and Axhausen, while the second numbers among its members Preisser, Mueller, Destot, Fontaine, and LeRiche. Quoting from Kohler, we find that he believes that the pathological process is brought about "by the special and abnormal anatomical conditions in the carpus at the time of the injury." The exciting factor, he thinks, is either continual small compression injuries peculiar to the occupation of the patient, or one single compression injury. The course of the disease, then, runs about as follows: (1) a short stage of slight articular irritation accompanied by some pain and limitation of motion; (2) a stage of relative absence of symptoms lasting perhaps for several months; and (3) a period of definite disease as seen typically by means of the x-rays, with severe clinical manifestations.

Diagnosis. Since a definite history of either a single severe compression injury or multiple small injuries cannot always be obtained, one must depend to a considerable extent upon the subjective and objective findings in the wrist. The suspicions of the examiner are aroused and the diagnosis is finally made only by means of the x-rays. The patient's usual complaint is pain, and the pain ordinarily is accentuated with use. Varying degrees of limitation of motion may be present and, if extreme, the grip of the patient may be weakened. On x-ray examination the typical sclerosis of the semilunar is noted. It is much more dense in appearance than the other bones of the carpus, and varying degrees of fragmentation are seen.

Treatment. The only conservative treatment which is at all effective in this disease is splinting of the wrist with the hand dorsiflexed in the position of function. This can be accomplished best by means of a molded leather splint with a light aluminum support on the volar surface. This splint should extend from the base of the fingers to the upper third of the forearm. In most instances the patients are subject to periodic attacks of pain, and as a rule they need wear the splint only during these times. If such conservative treatment is found to be insufficient, it is the consensus of opinion that extirpation of the bone is the next resort (70, 131).

Jaroschy (57) and Wiedhopf (149) discuss the operative removal of this bone. While in dislocations, because of their position, the volar approach is more satisfactory, in this condition the dorsal approach seems to be generally favored. The compact structures in the carpal tunnel and median nerve need not then be disturbed and the exposure of the dorsal capsule after retraction of the extensor tendons is made

easier. As after excision of the scaphoid, early motion is indicated as soon as wound healing is complete and the pain has subsided.

INJURIES TO REMAINING BONES OF THE CARPUS

Omitting severe crushing injuries of the hand and wrist, we find fractures of the bones of the carpus other than the naviculare relatively rare. During the five-year period reviewed the incidence was as follows:

A. Triquetrum (cuneiform).....	15 (135, 103, 141)
B. Multangulum majus (trapezium).	7 (31, 42, 60, 92)
C. Multangulum minus (trapezoid)..	1 (29)
D. Hamatum (unciform) (3 of which were avulsion fractures of the unciform process).....	4 (27, 34, 78)
E. Pisiform.....	3 (30)
F. Capitatum (os magnum).....	3 (42,111)

In the diagnosis of these rare injuries there is nothing typical about the mechanism of injury or the physical findings. The majority of them are found in the routine x-ray examination of the wrist, usually after various views are taken, and then only after a careful examination of the films.

Immobilization in a ventral position or, if much displacement exists, in a position favoring the approximation of the fragments, is recommended. Seldom was manipulation reduction suggested.

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SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Valentin, B.: Newer Aspects of Bone and Joint Tuberculosis (Neure Anschauungen ueber die Knochen- und Gelenktuberkulose). *Klin. Wchnschr.*, 1937, 2: 1092.

In a short historical review the author indicates that the purely conservative treatment of bone and joint tuberculosis has assumed a declining status and led to new unsolved problems. Foremost is the difficulty of diagnosis. It is of great importance to establish with reasonable certainty a diagnosis of bone and joint tuberculosis without operation. The roentgenogram is not an infallible aid; too often the films provide insufficient detail for interpretation. Studies among twins have shown that hereditary predisposition is significant for the origin and maturation of tuberculosis; it is true likewise of bone and joint tuberculosis. The importance of these considerations was demonstrated in observations among siblings of blood-related families. According to the very careful work of Johannson and Lundt it is no longer justifiable to consider as definite tuberculosis those cases which have only a strong clinical resemblance. Especially in hip and knee-joint tuberculosis the diagnosis must be left open very often. Clairmont and Stich have published similar conclusions.

From the therapeutic standpoint the patient with a painful, somewhat movable joint is in a worse condition than the one whose joint has healed in a good position and is painless even though ankylosed. The author believes that Finck's treatment of spinal gibbus deformity yields successful results in two-thirds of the cases.

In conclusion, the author stresses the need for prophylactic work in bone and joint tuberculosis, just as in the pulmonary form.

(Heinemann-Grueder). Jerome G. Finder, M.D.

Bisgard, J. D.: Experimental Giant-Cell Tumor and Cartilaginous Exostosis of Bone. *Arch. Surg.*, 1937, 35: 854.

The author reports experimental observations on 7 rabbits in which partial or complete traumatic separation of the lower ulnar epiphysis had occurred with subsequent incomplete replacement. When growth was resumed exostoses were produced at the diaphyseal side of the cartilage plate. In 2 instances they were simply bony; in 4 others, thin cartilaginous caps covered the bony projections; and in 1 the cap was of heavier cartilage.

In 2 animals lesions similar to giant-cell tumors of bone developed, near the site of the epiphyseal displacement in 1, and near the site of operative removal of a portion of the diaphysis of the radius in another. The relation of the latter lesions to hemorrhage is suggested, although a possible relationship to displaced bits of cartilage is also discussed.

Robert Portis, M.D.

Davie, T. B., and Cooke, W. E.: The Supervention of Osteogenic Sarcoma in Paget's Disease. *Brit. J. Surg.*, 1937, 25: 299.

The authors report the case of a woman of sixty-four who fractured her right humerus in turning over a mattress. Previous to this she had had rheumatic pains, a decrease in height, and some lumps under the scalp. The roentgenograms showed typical changes of Paget's disease in the humerus and skull, with the addition of punched-out areas resembling metastases from carcinoma.

At autopsy, the skull showed, in addition to the typical thickening of Paget's disease, several areas of bone destruction due to fleshy growths inside and outside of the skull. A fleshy tumor was found at the site of the humerus fracture, also several smaller tumors along the surface of the bone, under which the bone was softened. The hypophysis was normal, the thyroid was pale, and there was no enlargement of the parathyroids. Arteriosclerosis was found in the kidneys.

Sections of the tumors from the skull and humerus showed spindle-cell sarcoma. There were also numerous giant cells of the osteoclastoma type. There was no neoplastic new bone formation. The thyroid showed almost complete absence of colloid from the vesicles and the one parathyroid gland which was examined showed absence of oxyphil cells.

In the authors' second case roentgen-ray examination in a man of forty-two who had had pain in the legs for four years revealed Paget's disease of the spine, both bones of the right forearm, and of the skull. The appearance of the first and second lumbar vertebræ and of the forearm bones was suggestive of sarcoma. Just before death there was extreme emaciation and compression paraplegia.

At autopsy, several flattened pearly tumor nodules were found on the pleura of the right chest. All endocrine glands were examined; they showed no abnormality. In addition to Paget's disease, the skeletal system showed multiple foci of malignant disease. The largest of these sarcomatous masses was attached to the side of the lumbar vertebræ and caused erosion of the bone and compression of the cord. There were 3 in the skull. Histologically they were spindle-cell sarcomas.

The thyroid was deficient in colloid content and the parathyroid in oxyphil elements.

It was noted that in each of these 2 cases, the tumors were primary and not metastatic from any one source. Also, it was noted that the large tumors were attached to, but not growing in, the bones, and the small tumors were found embedded in the bone. Although the thyroid and parathyroid glands showed

abnormal features in both cases, it was thought that this may be a chance association of lesions.

Paget, in his third article, reported that he found malignant disease at death in 5 of 8 cases which he followed up. One of these was sarcoma, 1 probably sarcoma, 1 unspecified, and 2 were carcinoma. Although some observers doubt the etiological relationship between Paget's disease and sarcoma, others contend that the onset of such an uncommon lesion as osteogenic sarcoma in such a rare disease as Paget's must have some significance. It has been noted in 11 per cent of one series of cases. In a study of 72 cases of osteogenic sarcoma in patients over fifty years old, Coley and Sharp found Paget's disease in 28 per cent. The highest percentage (46.2 per cent) occurred in patients from sixty-five to seventy years old, and in the group between fifty-five and seventy years of age, nearly 40 per cent of all osteogenic sarcomas occurred in patients with Paget's disease. In this series 85 per cent of the patients with Paget's sarcoma were males. In 49 cases reviewed by the authors, 92 per cent were males.

As nearly as can be determined by statistics, it seems that about eight years is the average time in which sarcoma supervenes after the onset of Paget's disease. Some cases have been observed as early as two years and others as late as thirty-five years. The most frequent sites are the humerus, femur, and skull. At to histological type, these sarcomas are usually of the spindle-cell or mixed-cell type. In a few cases, the type may be that of fibrosarcoma or of osteochondrosarcoma.

Organs other than the skeletal system, especially the endocrine glands, have been investigated for changes in connection with Paget's disease. Diminished colloid content has been found in the thyroid, but this is not regarded as being of any etiological significance. Nothing abnormal has been found in any of the other endocrine glands including the parathyroids. Blood phosphatase is usually high; as many as 55 Bodansky units (normal 4 units) have been found in some advanced cases of this disease, but the serum concentration of calcium and phosphorus is normal.

Paget's disease has never been produced experimentally although it has been attempted in dogs by the injection of pituitary and parathyroid preparations. The fact that "bone pains" have been relieved and the blood-phosphatase lowered by the injection of insulin, and that high phosphatase occurred in depancreatized dogs, may have some etiological significance. Trauma as an etiological factor of malignant supervention seems to be eliminated; nor is there sufficient evidence that the malignant onset is due to inflammatory reaction, hormonal, or metabolic influence.

The prognosis is bad. The average duration of life after the appearance of the sarcoma was eight months in Bird's series of 9 cases. In another series of 31 cases, all but one terminated fatally within a few months.

Intensive radiation may be effective in relieving pain in the terminal stages of the disease.

WILLIAM ARTHUR CLARK, M.D.

Edling, L.: Contribution to the Pathology and Clinical Picture of Reticulum-Cell Sarcoma. *Radiology*, 1938, 30: 19.

The name reticulum-cell sarcoma has been selected for these affections of the reticulo-endothelial system because the reticulum cells do not overlie a preformed reticulum, but form a cytoplasmic reticulum themselves. This cellular reticulum formation is an important differential factor in the microscopic study of these and other tumors of the upper air passages. The reticulum-cell sarcomas are derived from the reticulum cells of the lymphatic tissue and not from the lymphatic cells like the lymphocytomas.

The reticulum-cell sarcomas are divided into 4 groups:

1. The immature, undifferentiated, or primary type of tumor is built up of a uniform syncytium of large, pale, round, and polygonal cells, anastomosing with each other through abundant strands of cytoplasm. The cells have a large bulb-shaped nucleus, with finely divided chromatin, a distinct nucleolus, and a sparse cytoplasm often containing numerous droplets of fat.

2. The mature forms are characterized by the tendency of the tumor cells to develop fine fibrils which arise within the plasma, but with tumors of a higher degree of maturity these fibrils are seen to enlace the cells of the syncytium as a wide branching network. In the early stages this fibrillar network becomes apparent only on staining with silver, but with greater differentiation it can in part assume a collagenic character. The youngest portions within the syncytium, the centers of proliferation, appear as areas more or less free from fibrils. It is impossible to draw a sharp histological line of differentiation between the types of reticulum-cell sarcomas. This necessitates a classification that considers the predominant morphological characters of the cells.

3. The polymorphocellular type is characterized by extremely varying forms of cells, round, polygonal, or highly irregular, often connected with each other by protoplasmic offshoots, so as to form continuous synplasmas. The cells frequently develop into phagocytes. There are often numerous giant-cells with lobed or fragmented nuclei. Differentiation of the fibrils which is susceptible to silver staining occurs, but this is not a predominant feature.

4. The associated or combined forms are those in which the blastomatous process in the reticulo-endothelium is combined with pathological proliferation of other cellular elements, such as leucemia or lymphogranulomatosis.

The author believes that the theory of specific lympho-epithelium is inadequate as an explanation of the etiology for the reticulum-cell sarcomas and other closely associated tumors of the reticulo-endothelial system. This type of cell infiltration may

be the response to infection. Evidence is presented to support this theory.

Eighteen new cases of reticulum-cell sarcoma and 2 new cases of generalized reticulosis are presented. All cases were verified by biopsy and 6 of them were given post-mortem examinations.

One case was classified as belonging to the immature type. Nine cases were fibrillogenic, and 3 belonged to the polymorphocellular group. Three cases were not classified because of insufficient material.

Photomicrographs showing detail of the structure, roentgenograms, and charts are presented, and differential diagnostic factors are discussed from a clinical view.

Reticulum-cell sarcomas are regarded as extremely malignant; they metastasize early and in a generalized manner, and possess great radiosensitivity.

Surgery is contra-indicated and radiation therapy is regarded as the only method from which there is any prospect of obtaining lasting freedom from symptoms. The results from radiation therapy are poor in general. Good results are dependent upon the character of the material. In general, tumors with marked radiosensitivity often give poor results with regard to permanent cure. This has proven true in radiotherapy of the reticulum-cell sarcomas.

ROBERT P. MONTGOMERY, M.D.

McMaster, P. E.: The Influence of Venous Stasis on the Production of Chronic Arthritis. *Arch. Surg.*, 1937, 35: 833.

A clinical study of 30 patients presenting histories of long-standing varicose veins of the legs was undertaken to show the effect, if any, that venous stasis has on the production of chronic arthritis.

In addition to varicose veins, these patients had marked congestion of the ankle and feet associated with edema, cyanosis, and eczematous skin changes. Frequently there was a decrease in the cutaneous temperature of the feet, and the arterial pulsation of the dorsalis pedis and posterior tibial arteries was diminished. Some of the patients had ulcerations on the legs of varying duration.

Roentgenograms of the legs and feet were studied for signs of chronic arthritis, such as capsular thickening, marginal articular lipping, narrowing of the articular cartilage, and subchondral sclerosis, and for periosteal new bone formation of the tibia and fibula.

Autopsy material of tissue surrounding and including the joint capsules of the ankles and feet was obtained in 3 cases. On gross examination this tissue was thickened as from edema and, microscopically, revealed evidence of edema, arterial thickening with some thrombosis, and an increase in fibrosis.

Twenty-one of the 30 patients were men and 9 were women. The ages ranged from twenty-nine to eighty-three years and the varicose veins had been present from one to fifty years. Eighteen patients had old healed varicose ulcers and ulcerous lesions on the legs when studied. There were 5 cases in which hypertrophic arthritis of joints other than those of the foot and ankle was demonstrated.

In 21 cases there was no roentgenographic evidence of arthritis, even though in 9 of these there were varicose ulcers.

In 9 cases, there was roentgenographic evidence of chronic arthritis. In each of these, there was an associated varicose ulcer, either active or healed near the ankle joint. Seven of the 9 cases had active ulcerous lesions. These all showed periosteal new bone formation involving either the tibia or the fibula or both. In addition to the periostitis, in 3 of these 7 cases there were arthritic changes in the joints of the foot and ankles. In none of these cases were there marked changes in the joints except in 1 in which there was an added "mechanical factor" from a poor weight-bearing alinement at the ankle joint due to malposition of a fractured tibia. In 1 case of very severe bilateral varicose veins, of twenty-five years' duration, with large ulcerous lesions present for several years, diffuse extensive edema of the foot and ankle, eczematous changes of the skin, and cyanosis, only minor arthritic changes were observed.

The author concludes that in cases of marked venous stasis resulting from varicose veins, chronic arthritis did not develop unless it was complicated by ulcerous infection near the ankle, and then the arthritic changes were not of an advanced degree.

The author refers to experimental data from various sources as an aid in the interpretation of his clinical study.

ROBERT P. MONTGOMERY, M.D.

Snyder, R. G.: The Arthritis Problem. *Med. Clin. North Am.*, 1937, 21: 1595.

A serious organized effort to study arthritis was instigated by some of the leading European governments because of the enormous continued expense of treating this disease among their war veterans. There is now an American Society for the Study and Control of Rheumatism and Arthritis whose meetings serve as a center in which all available information on arthritis may be discussed and critically evaluated. Reviews of American, English, French, and German literature are made annually.

The American Committee for the Control of Rheumatism has compiled a classification of arthritis which is the best that has been devised to date.

Eighty per cent of cases of rheumatoid arthritis occur between the ages of ten and thirty years. The patients are usually underweight, flat chested, and moderately anemic. Foci of infection can frequently be found.

Osteo-arthritis (hypertrophic) is seen ordinarily in fairly robust persons past middle life who complain of a gradual increase of stiffness and pain in the weight-bearing joints. Ankylosis and deformity are comparatively rare.

The treatment of chronic arthritis is based upon routine examination and tests. A patient with low resistance should be given milder treatments than would be given to one in robust health.

All devitalized or crowned teeth should be viewed with suspicion. The tonsils should be inspected for congestion of the anterior pillars and an effort should be made in every instance to force concealed pus from the tonsillar crypts. Examination for flat feet and faulty posture should be made in an effort to eliminate these as contributory factors.

With the clinical facts to be obtained by thorough methods of examination it is usually possible to plan a satisfactory therapeutic regime and to obtain beneficial results in a large proportion of cases of rheumatoid arthritis. Patients with a mixed type of arthritis are the most difficult to treat. It is important to build up the patient's general resistance with proper diet, adequate elimination, and a sufficient amount of rest. Analgesics, such as sodium salicylate or aspirin, are given in maximum doses to relieve pain. Heat in any form may be utilized.

If the joint symptoms are not relieved by ordinary methods and if roentgen examination reveals that the disability is due in part to a mechanical obstruction of the joint, operative removal is advised.

In the management of chronic arthritis treatment must be adapted to the individual patient and a combined method of treatment is usually utilized, namely: (1) relief of the mental depression; (2) controlled rest and exercise; (3) removal of the foci of infection; (4) modification of the diet when indicated; (5) drug therapy with aspirin and cinchophen; (6) vaccine therapy; (7) colonic irrigations; and (8) physical therapy and surgery.

In refractory cases the following methods of treatment are also utilized as indicated:

1. Gold therapy: in the author's experience the results of this form of therapy are generally satisfactory. Varying degrees of improvement have been obtained. It is used in those cases which do not respond to the usual forms of treatment, including the vaccine therapy.

2. Sulphur therapy: the writer's experience with this method has been very limited.

3. Bee venom: an improvement has been noted in several cases which have been very resistant to every other form of treatment. Artificial bee venom has proved unsatisfactory.

4. Roentgen therapy has been of definite value in several refractory cases.

5. Vitamin therapy is being tested on a group of 30 patients. Most of these patients have shown a general tonic improvement in the past year, but the arthritis has remained almost unchanged.

6. Bilirubin and bile salts given intravenously: the author has had little experience with this type of therapy. RICHARD J. BENNETT, JR., M.D.

Coryn, G.: Endocrine Diseases of the Skeleton (Les affections endocriniennes du squelette). *Presse méd.*, Paris, 1937, 45: 1582.

Coryn states that both experimental findings and clinical observations show that the anterior lobe of the pituitary gland influences the growth of the skeleton, and that the influence depends upon the function of the eosinophile cells. Clinical observation has shown that hypofunction of these cells results in an arrest of growth and dwarfism, but such dwarfs, unless there are some other endocrine disturbances, are well proportioned. If hyperfunction of the eosinophile cells of the anterior pituitary lobe develops in childhood, it results in giantism; such pituitary giants are well proportioned. If hyperfunction of the eosinophile cells develops in adults, it results in acromegaly. Pathologically, the changes are noted in the cartilaginous structures; the cellular proliferation of the cartilage is diminished in hypofunction of the eosinophiles and increased in hyperfunction.

The author has found no evidence that the eosinophile cells affect the calcification of the skeleton. If other endocrine disturbances are associated, there may be other skeletal changes, but in the study of acromegaly and dwarfism without any associated endocrine disturbance, the author has found no evidence of abnormal calcification of bones or of disturbances of calcium metabolism. He reports 2 illustrative cases, one of acromegaly in a man fifty-two years of age, the other a case of pituitary dwarfism in a woman fifty-seven years of age. In both these patients careful examination showed no evidence of thyroid, parathyroid, adrenal, or gonadal hyperfunction or hypofunction. In both, roentgenograms showed normal calcification of the bones, and the blood calcium and calcium metabolism were found to be normal. ALICE M. MEYERS.

Hanák, F.: Tennis Elbow (Tennisellbogen). *Bratislav. lek. Listy*, 1937, 17: 430.

Hanák gives a definition of "tennis elbow" as a condition which comes not only through playing tennis, but also from other sports and occupations where the same muscle mechanism comes into play, as with shoemakers, painters, washerwomen, golf players, buglers, and milkmaids. The symptoms are described and then the different opinions as to its cause. Hohman considers the lesion as a periosteitis in the neighborhood of the lateral epicondyle of the humerus; Carp believes the cause to be an overexertion of the muscles, especially of the extensor digitorum communis. From perusal of the literature and his own experience Hanák believes it is due to use of muscles which have not grown accustomed to the demands placed upon them. Clinically, the trouble is manifested by tenderness and pain at the insertion of the flexor digitorum communis on the outer epicondyle. The roentgenogram is negative. Many times on deep palpation the same pain can be elicited as with motion of the elbow.

The treatment is rest, and then gradual training of the muscles. For persistent pain roentgen therapy is excellent; after three treatments the pain disappears. Diathermy is useful. In acute cases very good results are obtained by fixation in a splint for three or four weeks and then roentgen therapy. Operation is condemned.

HAWTHORNE C. WALLACE, M.D.

Cloward, R. B., and Bucy, P. C.: Spinal Extradural Cyst and Kyphosis Dorsalis Juvenilis. *Am. J. Roentgenol.*, 1937, 38: 681.

Extradural cysts of the spinal cord which give rise to symptoms during adolescence are usually associated with kyphosis dorsalis juvenilis. A case is reported. Nine other cases collected from the literature are presented.

Spinal extradural cysts typically arise in the lower midthoracic region of adolescent boys. A severe spastic paraplegia results with slight sensory changes and usually without pain. These symptoms are practically always associated with kyphosis of the thoracic spine or with alterations in the vertebral bodies which are typical of the early changes in kyphosis dorsalis juvenilis.

Seventy per cent of this series occurred in adolescent boys ranging from eight and one-half to sixteen years of age. Two cases were noted in negro boys.

The initial symptom was practically always that of weakness in the lower extremities which progressed fairly rapidly to an incapacitating spastic paraplegia. In fifty per cent of the cases there was a disturbance in the function of the bowel or bladder or both. Rest with or without hyperextension brought about a striking amelioration of the symptoms.

Fifty per cent of the cases here enumerated showed a block of the spinal subarachnoid space. If Queckenstedt's test failed, lipiodol demonstrated a spinal block. Examination of the spinal fluid revealed a clear, colorless fluid. The protein content was rarely increased to any degree.

The anteroposterior roentgenogram demonstrated an increase in the size of the spinal canal. The interpedicular distance at the level of the intraspinal lesion was increased. The pedicles were reduced in thickness. The medial surfaces were flattened or concave, or the pedicles were reduced to thin lamellæ.

Alterations were present in the vertebral bodies typical of the early prekyphotic lesions of kyphosis dorsalis juvenilis. The earliest change in the vertebral bodies was a rounding-off of the anterosuperior and antero-inferior corners. This erosion continued until there were small step-like defects at these places. There was also a reduction in radio-density of the anterior one-half or one-third of the bodies. The superior and inferior surfaces of the bodies became irregular and prolapses of the intervertebral disc or nucleus pulposus into the body occurred. The intervertebral space became thinner and cloudy and the bodies even came in contact with one another at times. The involved bodies then collapsed anteriorly and became wedge shaped. There was thus a rounded kyphosis in contrast to the sharp angular kyphosis of tuberculosis of the spine.

The differential diagnosis includes: tuberculosis of the spine; simple uncomplicated kyphosis dorsalis juvenilis; syringomyelia; and tumors.

In gross appearance the laminæ and pedicles are thinned. The cyst lies directly beneath the laminæ and fills the spinal canal posterior to the dura mater. The wall of the cyst is thin and white, and closely resembles the dura mater. The blood supply is by way of a pedicle which is apparently attached to one of the spinal roots. The contents of the cyst is a clear, colorless fluid practically identical with cerebrospinal fluid. The cysts are usually single and unilocular.

The wall of the cyst is composed of densely packed fibers of collagen. It is relatively acellular and avascular, the only vessels being on the external surface. The internal surface consists of a single layer of elongated, flattened cells which bear a striking resemblance to the arachnoid membrane. Microscopically the wall seems to be formed by a fusion of the dura mater and arachnoid into a single membrane.

The most logical hypothesis as to the origin of these cysts is that they arise as a diverticulum of the dura mater or a herniation of the arachnoid membrane. Apparently there is always a pedicle attached to the meningeal sleeve along one of the spinal roots.

Due to abnormal pressures of neighboring soft parts, bony absorption takes place. The intervertebral discs do not show absorption in response to increased pressure like bone.

The majority of cases of kyphosis dorsalis juvenilis occur in boys between the ages of fourteen and seventeen. Kyphosis is always rounded because of the partial collapse of a number of contiguous vertebral bodies, and is never angular, never severe, and is self-arresting. It is most severe in the eighth and ninth thoracic vertebræ and is always limited to the lower half of the thoracic spine. Changes in the vertebræ are limited to the superior and inferior surfaces, especially the anterior part. At first the patient is able to correct the deformity voluntarily, but within a few months the deformity becomes fixed. The authors believe the causes are similar to those of spinal extradural cyst.

The kyphosis dorsalis juvenilis present in association with spinal extradural cysts is due to compression and occlusion of the venous channels draining the vertebral bodies by the cysts. Kyphosis dorsalis juvenilis unassociated with spinal extradural cysts may also be due to venous congestion and stasis within the vertebral bodies.

RICHARD J. BENNETT, JR., M.D.

Iversen, S. C.: Hip Disease in Childhood and Its Consequences (Die kindliche Hueftgelenkentzuendung und ihre Folgezustaende). *Hosp.-Tid.*, 1937, p. 629.

The results in 29 cases of non-specific coxitis of early childhood were reported. The condition rather suddenly affects apparently healthy children. Frequently a primary focus of infection is found: a mild enteritis, skin lesion about the anus, an infected umbilical stump, angina, bronchitis, pneumonia, or otitis. Pneumococci, staphylococci, and streptococci are the predominating etiological factors in coxitis of childhood; colon bacilli, enterococci, and

Pfeiffer's influenza bacilli are also factors; even tuberculous disease of the hip may occur in the first years of life. Characteristic are the localized abscesses with dependent perforation and discharge of a large volume of pus, spontaneously or after incision. Healing is the rule within a few weeks. Nevertheless, even mildly affected patients may develop a limp. Often, despite few typical symptoms, a chronic dissecting fistula may develop. Spontaneous healing without abscess formation or perforation occurs occasionally, but often in these cases an erroneous diagnosis is established, overlooking such conditions as lymphadenitis, rickets, erysipelas, tuberculosis, and congenital dislocation of the hip. The pathological changes are frequently only of the synovial type, destruction of cartilage, pannus, rupture of the capsule, and periarticular abscesses; usually an osteoarthritis predisposes to a secondary pyarthrosis and has its origin in the capital epiphysis. Infantile paralysis, Parrot's syphilitic pseudoparalysis, and Barlow's infantile scurvy should be considered in the differential diagnosis. In general, the prognosis for life is good. A typical sequela is a dislocation of the hip from distention, with a more or less marked defect of the head and neck.

The persistent lesions of the hip are classified into 4 types by the author: (1) dislocation with destruction of the head and neck (20 patients); (2) dislocation with mild defects of the head and neck (4 patients); (3) no dislocation (2 cases); and (4) subluxation of the head (3 cases). Bony ankylosis which is so frequently seen in tuberculous coxitis, is practically never present in these cases. Residual bone shortening may be considerable; limitation of motion, muscle weakness, and contractures are common findings. Pain is the outstanding symptom in the adult and usually predominates in the hip, seldom in the back. These are the most frequent grounds for invalidism. In dislocation the hip should be replaced as soon as possible. When treatment by abduction is necessary, it must be prolonged at best, using splints and plaster jackets. When stretching is indicated, it is managed by extension. Finally, orthopedic and surgical care must be employed, such as compensatory adjustments for shortening by specialized shoework, tenotomy and capsulotomy for flexion contracture; and osteotomy.

(HAAGEN). JEROME G. FINDER, M.D.

Amprino, R., and Trivellini, A.: The Functional Significance of the Architecture and Structure of the Neck of the Femur at Various Ages and in Pathological Conditions (Il significato funzionale dell' architettura e della struttura del collo del femore nelle varie età ed in condizioni patologiche). *Arch. ital. di chir.*, 1937, 47: 1.

The authors give a detailed and precise description of the mechanical and structural factors in the upper end of the femur as demonstrated by study of the trabeculæ in the spongiosa. There are a number of illustrations which clarify the method of study and indicate the objective findings.

The disposition of the connective-tissue fibers, the quantity of interfibrillary substance, the existence of cartilaginous cell nests, and the presence of calcium salts have an important influence on the resistance of the tissues to mechanical stress. The connective-tissue fibrils respond chiefly to traction; the interfibrillar substance augments the cohesion of the fibers themselves. The cellular groups, especially the cartilage, increase the elasticity to pressure by acting as little cushions. The direction of the collagenous fibers bears a close relation to the mechanical functions. The relation between structure and function of bone is very complex. The factors mentioned are so arranged as to form a homogeneous physical system. Also the substances are so arranged that every single part of the skeletal system offers a characteristic and individual reaction to every mechanical stress such as muscular action, body weight, and trauma. Previous investigators have been impressed by the characteristic distribution of the compact substance and the spongy substance in various bones. The trabeculæ of the spongy substance, their varied form and extent, are not grouped accidentally but respond to the forces to which the individual trabeculæ are exposed. In cases in which these individual forces have been analyzed it has been found that the direction of the trabeculæ corresponds in a definite manner to the so-called "isostatic" line of a physical body. This disposition of the tissues results in a great economy in the materials, as may readily be recognized by studying the compact substance in the diaphysis of a long bone. Ordinarily there is a generous supply of materials; but in old age there is a senile osteoporosis with a corresponding diminution in bone materials. It is probable that in part this depends on a diminution in the intensity of the mechanical actions to which these substances are exposed in old age. However, the residual bone matter in the aged is arranged most advantageously for purposes of function. Thus, in old age the smaller amount of bone substance gives the same results as a much larger quantity of bone might give a young person.

The authors have studied minutely the head and superior epiphysis of the femur at various ages and under varying conditions of function. Frontal and transverse sections were studied microscopically as well as roentgenologically and compared with similar sections from femora which had not been subject to stress for long periods because of amputation or disease. The object of the investigation was (a) to determine the structure of the spongiosa in the upper end of the femur in the adult, and its variations at different ages; (b) to illustrate the structure of the spongiosa in cases not subject to normal function; and (c) to determine the mechanical significance of the various tissue elements in the spongiosa. The authors find three principle systems of trabeculæ in the superior epiphysis of the femur: (1) the straight trabeculæ; (2) the curved; and (3) the supporting. The authors found these trabeculæ to vary in individuals at various ages. These variations are

shown in suitable illustrations. In the infant these tissues are large fragments of irregularly placed lamellar bone. The central trabeculæ are the oldest; the new bone is laid down at the periphery under the periosteum. In osteoporosis it is the central trabeculæ that are first involved. With the appearance of senile osteoporosis the individual differences in bone structure become more apparent.

In discussing the relation of bone architecture to function, the authors point out that the weight of the body, which falls on the head of the femur, tends to flatten the neck. In the neck of the femur the straight trabeculæ counteract the effects of pressure stress and the curved trabeculæ react to the flattening tendency exerted by the weight of the body.

JACOB E. KLEIN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Dickson, J. A.: The Treatment of Torticollis. *Surg. Clin. North Am.*, 1937, 17: 1349.

Torticollis usually shows contracture of one sternocleidomastoid muscle and lateral flexion of the head on the same side and rotation and elevation of the chin to the opposite side. There sometimes are secondary changes in the face, skull, spine, neck, and shoulders. The cause of this condition is believed to be a disturbance of the vascular mechanism of the sternocleidomastoid muscle. In the author's experience, mechanical appliances are very unsatisfactory. If conservative measures are to be used, massage and passive movement of the head have been found to be of great value.

Open operation shortly after the appearance of the symptoms does much to minimize undesirable secondary features. In older patients and in infants who fail to respond to physical therapy, the best results are obtained by operative interference. The contracted muscle may be incised at its origin, its insertion, or anywhere along its course, but, irrespective of where the muscle is divided, a complete division of all contracting bands must be carried out.

Postoperatively, sandbag immobilization is recommended. Physical therapy in the form of active and passive movement is started as soon as the pain has subsided. Massage is instituted as soon as the wound is well healed. The patient is allowed to be up in from twelve to fourteen days. The results are encouraging. RICHARD J. BENNETT, JR., M.D.

Orell, S.: Surgical Bone Grafting with "Os Purum," "Os Novum," and "Boiled Bone." *J. Bone & Joint Surg.*, 1937, 19: 873.

In addition to using fresh autoplastic bone grafts, the author uses bone obtained from meat-packing houses and amputation specimens after preparing them by a physicochemical process, subperiosteal implantation, and by boiling. Each process of preparation yields a bone that has its special range of use, its advantages, and disadvantages.

Os purum is composed of the calcium framework of dead bone from which the proteins, connective tissue, and fat have been removed by a physicochemical process. The blood protein is extracted by soaking the bone in salt solution; the connective tissue on the bone surface and in the haversian canals is removed by soaking it in warm potassium hydroxide; and the fat is extracted with acetone.

Os purum has a technical advantage in that it can be kept on hand in a dry form and sterilized by boiling in physiological salt solution. This dissolves a part of the collagenous glue-like material, and makes the material softer and easier to handle. It may be obtained in various sizes and can easily be given any desired shape.

Os purum is used as implants in the skeleton, that is, in places containing skeletal connective tissue. This connective tissue proliferates and quickly forms a large amount of new bone in the clefts between the implant, the fixed bone in the bed, and the periosteum, and grows into the haversian canals of the os purum. Os purum was used in about 50 cases in which bone had been resected for various reasons, most often for tuberculosis, in order to fill the defects, to lessen the risk of deformities, and to fix skeletal parts one to another.

Os novum is immature living bone tissue with great proliferative power. It is produced by implanting a long narrow os-purum splint subperiosteally over the anteromedial surface of the tibia. When the material is excised from one to two months later, a profuse growth of new, soft, vascular bone is found in the clefts between the periosteum, the os purum, and the tibia. This new bone is excised and transplanted to areas where extraskeletal connective tissue separates two bones which are to be joined through transplantation, for example, in osteosynthesis of the spinous processes in tuberculosis of the vertebræ, arthrodesis in iliosacral tuberculosis or tuberculosis of other joints, and in osteosynthesis in pseudarthrosis. As a rule in the latter case no excision of the soft tissue of the pseudarthrosis is done. The os novum is laid down in longitudinal strips like periosteal callus around a pseudarthrosis.

"The transformation of the new bone formed after the implantation of os novum proceeds more uniformly than is the case after the transplantation of fresh mature bone, probably because calcium-containing necrotic bone prevents the formation of new bone. The newly formed splint is firm throughout. Weak areas or defects do not appear as readily as after the transplantation of mature fresh bone, and consequently fractures do not occur. No real fracture of os novum has been observed in any of the cases operated upon to date.

"The surgical production of os novum shows that the bone-forming cells of the skeletal connective tissue grow most quickly and abundantly into the tissue-free clefts between the periosteum, graft, and bone after preliminary hematoma formation (blood, fibrin, tissue fluids). However, it is not desirable to have the hematoma formation so excessive that the

newly formed skeletal connective-tissue cells are unable to penetrate the mass.

"The soft and vascular osteoid and newly formed skeletal connective tissue of os novum readily absorbs nutrition and forms new bone. Because of its softness, it can be shaped easily and without injury to fit the new bed, and it is better tolerated by the soft tissues than is fresh, mature, hard bone. Scarred, eczematous skin, for example, which is often present over a pseudarthrosis, does not seem to be so greatly irritated by os novum as by hard bone.

"At first, os novum gives only slight mechanical support, and cannot, therefore, be used for the internal fixation of bone parts. Since it is easily nourished and has great proliferative power, it is suitable for cases in which rapid new bone formation is desired, and where fresh material should not be taken from the skeleton itself, as, for example, in children with delicate bony framework. If increased internal fixation is desired, a combination of os purum and os novum may be used."

Boiled fresh bone contains proteins, connective tissue, and fat. When boiled and dried bone is used for grafting, its resorption and the growth of new bone proceed very slowly and the result is much less satisfactory than when fresh boiled bone is used.

The author has resected osteomyelitic and tumor-infiltrated bones, boiled the resected specimens in physiological salt solution to kill the bacteria or tumor cells, cleared the bone of diseased tissue masses, and replanted them for mechanical support until new bone had been developed.

Four cases of chronic osteomyelitis and 1 case of malignant periosteal osteogenic sarcoma in the upper end of the humerus were treated by resection and reimplantation of boiled bone. None of the cases showed recurrences. The patient with the osteogenic sarcoma died from a pulmonary metastasis fifteen and one-half months after the operation and no recurrence in the humerus or in the soft parts of the upper arm was found at post-mortem examination.

Resection and replantation of boiled bone is used because it is difficult to duplicate the size, shape, and structure of the affected part with other forms of bone graft.

"The study of bone-grafting teaches us that the bone should be considered as a tissue, the survival of which, like other living tissues, is dependent upon good nutrition. Every effort should be made to favor the nutrition of the soft tissues about the surface of the fixed bone in the operative field. The periosteum should not be separated from the soft parts lying outside, and the connective tissue in the haversian canals should not be injured through damage to the nutrient vessels. The instruments should be as small as possible and produce the least possible trauma. Experience has taught that the best method of exposing the bone is to loosen the periosteum from it. Nothing is gained by traumatizing the tissues lying external to the periosteum."

ROBERT P. MONTGOMERY, M.D.

Harkins, H. N., and Phemister, D. B.: Onlay Grafts. *J. Am. M. Ass.*, 1937, 109: 1501.

The authors describe a simplification of bone-grafting technique which is applicable to ununited fractures of long bones and the mandible if the fragments are in satisfactory position pre-operatively. Whole-thickness and cancellous bone grafts are used together as onlay grafts. The only internal fixation of the grafts is that accomplished by suture of the soft parts over them. Stripping of soft parts from the bone is done only in the region chosen for the bed of the graft. Projecting bone and callus are removed to give a flat surface for contact of the grafts. Callus and fibrous tissue intervening between the ununited fragments was usually curetted out, but it was found that intermedullary bony callus need not be removed from the fragment ends. Grafts were usually removed from a normal tibia, but occasionally a long fragment was the source of a graft. Periosteum was never allowed to intervene between the graft and cortex of the ununited fragments. The region was immobilized postoperatively for two or three months.

This method can occasionally be applied to ununited tibial fractures in which there is residual infection anteriorly but none posteriorly. The grafts are applied through a posterior approach and the infected field is not entered.

The method was used in 39 of 93 cases of ununited fractures presented during the past eight years. In 38, the operation resulted in union, and in the thirty-ninth, bony union was attained after reoperation. The method avoids the extensive stripping of periosteum incident to most other operative procedures and reduces surgical trauma as well as necrosis of the bone ends at the site of ununited fractures in selected cases to which it is applicable.

ROBERT PORTIS, M.D.

FRACTURES AND DISLOCATIONS

Cozen, L.: Congenital Dislocation of the Shoulder and Other Anomalies: Report of a Case and Review of the Literature. *Arch. Surg.*, 1937, 35: 956.

A case of multiple congenital deformities with bilateral dislocation of the shoulders is reported. It was difficult to determine the cause. The case was differentiated from traumatic cases in which there is a history of abnormal delivery, cases in which there are paretic muscles in the affected arm, and also from cases presenting other congenital deformities.

The patient was first operated on by reefing the pendulous capsules, but after a period of four years it was necessary to do a Nicola operation on one shoulder because of relaxation of the capsule. The result of this operation was excellent shoulder function.

The general outline of treatment may be expectant, manipulative, or operative.

ELVEN J. BERKHEISER, M.D.

Bates, W.: Fracture of the Upper Third of the Humerus. *Surg. Clin. North Am.*, 1937, 17: 1585.

The author makes a broad classification of fractures of the upper third of the humerus, i.e., those that are associated with dislocation and those that are not. Treatment for each group is discussed.

He believes that the dislocation should always be reduced before an attempt is made to treat the fracture. Roentgenograms should be taken before the reduction of the dislocation. Fractures of the greater tuberosity associated with dislocation should be immobilized from four to five weeks in 90 degrees abduction with 180 degrees of external rotation. Fractures of the surgical neck with dislocation frequently require traction of the arm at right angles to the body for from seven to ten days before immobilization in 90 degrees abduction and 90 degrees external rotation. In fractures that are not associated with dislocation and are impacted the author advises a plaster-of-Paris shoulder cap and sling for five or six weeks with elbow, wrist, and finger motion after two weeks. If there is gross displacement and manipulation is unsuccessful, traction for ten days may be necessary.

For after-treatment the author has found well supervised occupational therapy the most valuable. The article is illustrated with roentgenograms.

BARBARA B. STIMSON, M.D.

Robertson, D. E.: Fractures and Dislocations Involving the Elbow Joint in Children. *Am. J. Surg.*, 1938, 39: 327.

The diagnosis of fractures, dislocations, and other injuries about the elbow joint in children depends upon pain, loss of function, swelling, and corroboration by a roentgenogram. Each type of injury requires an accurate diagnosis and special treatment.

Examination of the extremity for impairment of function of the blood vessels and nerves should be made before treatment. Incomplete division of the median nerve and rupture of the brachial artery may occur in supracondylar fractures. If there is any interference with the circulation or the innervation, it is advised that these abnormalities be demonstrated to assistants, nurses, or parents before any treatment is started. Many suits for malpractice may be avoided in this way.

Reduction of the injured part should be done as soon as possible after the accident. Marked shock is the only justifiable reason for delay and even when marked shock exists, gross deformity should be diminished. Surgical treatment may be delayed as there is no special urgency for open reduction.

Close observance of the limb, distal to the fracture, during the first forty-eight hours following reduction will lessen complications.

No morphine should be administered to any patient who has had a reduction of a fracture of the elbow joint without first ascertaining that there is a full and complete blood supply to the hand and that the patient is well able to move his fingers and hand.

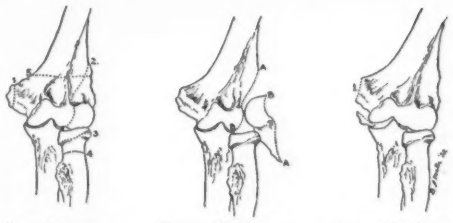

Fig. 1. *Condylar fractures. Lines of stress.* The lines of fracture in the lower end of the humerus follow: (1) the internal condylar fracture; (2) the external condylar fracture; (3) and (4) the lines of fractures that occur in the head and neck of the radius. *External condylar fracture.* The rotation of the fragment is shown so that the fractured surface lies under the skin. Its reduction requires rotation through 160 degrees. *Internal condylar fracture.* Dislocation of the fractured element into the elbow joint to lie between the ulna and the trochlea. (Courtesy of Am. J. Surg.)

Postoperative and postmanipulative roentgenograms must show indisputably the correct and accurate reduction of fractures and dislocations. A clear anteroposterior view of the lower end of the humerus, with the elbow flexed, can be obtained only if the arm is flat on the plate, the tube in position directly above it and the forearm at an angle to the tube. This technique reveals the outline of the lower end of the humerus without distortion, and until this outline is correct a good result cannot be expected. One should not be satisfied with anything except a perfect reduction in fractures involving articular surfaces.

Injuries about the elbow are classified by the author and discussed individually. Pertinent aids and precautions in the treatment and follow-up care are presented.

Supracondylar fractures are most likely to produce impairment in the blood and nerve supply. The distal fragment is often displaced laterally as well as posteriorly. Swelling causes a correct position to appear as overcorrected, but this rarely occurs. Overcorrection is more desirable than undercorrection.

Caution should be taken in the interpretation of the roentgenograms of lateral epicondylar fractures because the capitellum remains in correct line with the head of the radius unless rotation is marked. If inadequate reduction is obtained a valgus deformity will develop and a tardy ulnar nerve paralysis may occur years later. If an open reduction is necessary the fragment should be securely fixed. The author uses screws or fine dowels of beef bone. The operative technique of fixation is described.

Fractures of the medial epicondyle result from a pull on the internal lateral ligament. The fragment is never very large, but in most instances it is dropped into the elbow joint, which necessitates an open reduction.

Fractures of the head and neck of the radius require an open reduction if the deformity is marked.

A fracture of the proximal half of the shaft of the ulna cannot occur without a dislocation or fracture of the head of the radius or of its shaft. Correction of this requires an open operation, because it is almost impossible to replace the head through and into the ligament by any other method.

The "pulled elbow" results when the weight is borne through the arm with the elbow hyperextended. The hyperextension allows the upper part of the articular ligament of the head of the radius to fall into the space between the head of the radius and the capitellum. The roentgenograms are negative. The treatment consists of grasping the child by the wrist, supinating the forearm, and extending the elbow. Frequently there will be heard a loud "crack" in the elbow joint; the pain will have disappeared; and full voluntary movement is restored. ROBERT P. MONTGOMERY, M.D.

Lapidari, M.: So-Called Luxation of the Semilunar Bone of the Carpus (Sulla cosidetta lussazione del semilunare). *Arch. ital. di chir.*, 1937, 47: 295.

Luxation of the carpal semilunar bone associated or unassociated with fracture of the other carpal bones, especially the scaphoid, is a lesion which does not occur very frequently. From the beginning this lesion is followed by considerable functional disturbances associated with much pain, but in the majority of cases the surgeon is consulted too late to institute efficacious treatment.

Donati has subdivided this lesion anatomicopathologically into four types:

1. Anterior luxation of the semilunar bone, either subglenoidal or preglenoidal.

2. Posterior retrolunar luxation of the hand, i.e., a posterior luxation of all the bones except the semilunar, the dislocation taking place along the perilunar articular line. The dislocated bones are shifted to a plane posterior to the semilunar bone but not posterior to the radius.

Fig. 1.

A B C

Fig. 2A. Retrolunar luxation of the carpus with anterior luxation of the semilunar bone complicated by a fracture of the scaphoid. (Variety III of Donati.)

Fig. 2B. Condition after a few minutes of traction. The space of the semilunar bone between the radius and the os magnum (capitatum) is restored. The semilunar bone is partially reduced.

Fig. 2C. The semilunar bone is completely reduced.

3. A combination of the two aforementioned lesions.

4. Retrolunar luxation of the hand associated with a fracture of the scaphoid bone. In this type the semilunar bone and the proximal fragment of the scaphoid maintain their relationships to the radius and remain in their original position, whereas the distal fragment of the scaphoid follows the dislocation with the other carpal bones.

Luxation of the semilunar bone rarely occurs bilaterally and it is most commonly produced when the hand is violently thrown into hyperextension usually as the result of a fall. Fracture of the scaphoid bone is due to crushing, because this bone is violently compressed between the carpal bones of the distal row and the fossa of the radius at the instant of the trauma.

The symptoms associated with this injury include pain and functional impairment of the wrist extending into the fingers which are held in semiflexion. The fingers cannot be extended or flexed.

Objectively, a deformity of the dorsum of the hand can be noticed and this may often lead to an erroneous diagnosis of Colles' fracture. Diagnosis is made definite by means of the roentgenogram.

The prognosis of the untreated cases is very poor as far as carpal function is concerned. Physical therapy and mechanical measures are usually of no avail and for this reason patients usually consult the surgeon too late. Donati observed that on the average, patients sought surgical relief in from three to thirteen months following trauma.

First it is imperative to have roentgenological evidence of the type of lesion. Reduction of the luxa-

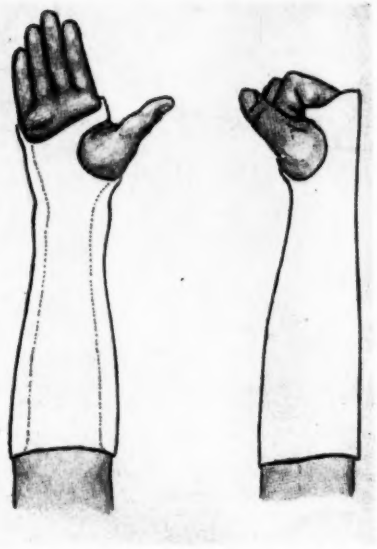

Fig. 3. The dotted lines indicate the limits of the plaster cast on the volar surface of the forearm.

tion-fracture should be initiated immediately thereafter. Non-surgical treatment should be attempted first in every case. For this purpose the author uses infiltration anesthesia into the radiocarpal joint with 20 c.cm. of a 2 per cent solution of novocaine. Traction is then applied as is indicated in Figure 1, after the upper arm has been fixed as shown in the illustration.

Figure 2A shows a retrolunar luxation of the carpus with an anterior luxation of the semilunar bone complicated by a fracture of the scaphoid. Figure 2B illustrates the condition after a few minutes of traction. The space occupied by the semilunar bone has been restored and the bone itself is partially reduced. Figure 2C shows complete reduction of the semilunar bone.

Following reduction, a dorsal antibrachial cast is applied as shown in Figure 3. The dotted lines indicate the limits of the plaster cast on the volar surface of the forearm. The fingers should be left free. Immobilization is maintained for from twenty to twenty-five days in simple cases, but in the presence of scaphoid fractures it should be prolonged to about two months.

During the period of immobilization the patient is instructed to move the fingers often in order to avoid joint rigidity, muscular atrophy, and osseous decalcification.

Some authors recommend immediate surgical removal of the semilunar bone because they believe that otherwise a necrosis of the semilunar bone (Kienboeck's disease) will ensue, but Lapidari believes that in every case non-surgical treatment should be attempted first.

RICHARD E. SOMMA, M.D.

Ferguson, L. K.: Fractures of the Carpal Scaphoid. *Surg. Clin. North Am.*, 1937, 17: 1603.

The author believes that with early and adequate immobilization most fractures of the carpal scaphoid heal with satisfactory functional results. The diagnosis should be suggested by careful examination and confirmed with the roentgen rays. A most helpful sign is pain elicited by pressure on the extended thumb toward the wrist. Immobilization by an accurately fitting unpadded plaster-of-Paris gauntlet from the metacarpal heads to the elbow and including the metacarpophalangeal joint of the thumb should be maintained for eight weeks.

"In 18 of 19 recent fractures good results were obtained, although bony union was not obtained in every case. In 5 of 6 old fractures, good functional results were obtained by the same treatment, although bony union was not obtained."

BARBARA B. STIMSON, M.D.

Aleman, O.: The Treatment of Fracture of the Navicular Bone of the Carpus (Ein Beitrag zur Behandlung der Fractura ossis navicularis carpi). *Acta chirurg. Scand.*, 1937, 80: 217.

The following classification of fractures of the navicular bone of the carpus is offered: (1) depressed fracture (extra-articular); (2) fracture of the tuberosity (extra-articular or intra-articular); (3) transverse fracture of the body (intra-articular), and (4) combinations of (1) and (2).

The result of the treatment of a fracture is judged partly from the anatomical and partly from the functional standpoint. With intra-articular fractures, good anatomical healing usually leads to good function, and a good functional result usually leads to an anatomically satisfactory healing. However, this does not always obtain with fractures of the navicular bone of the wrist. The functional demands put upon the wrist joint vary considerably with the occupation of the patient. One patient, whose old transverse fracture was treated conservatively by fixation while in military service and who later became a merchant, years later claimed to have been completely cured, but a later roentgenogram revealed a pseudarthrosis. Had this patient been compelled to become a handworker he would certainly have had arthritis deformans with considerable symptoms. If no roentgenogram had been taken the result would have been considered good. If good results are claimed in a case of fracture of the navicular bone from any kind of treatment, it is necessary, especially if no roentgenogram has been taken, to report upon the patient's occupation when determining the grade of the functional demands upon the wrist joint.

The author's material consists of all the navicular fractures seen at the Military Hospital at Stockholm from 1916 to 1935, those of the military personnel

Fig. 1.

and one nurse. There were 91 cases among 83 patients, 2 of which were bilateral, and 6 showed poor results from conservative treatment. The patients were generally young persons in the second decade of life. Fifty-two fractures were in the right wrist and 39 in the left. Of the fractures of the body of the bone, transverse fractures, 36 were fresh or early fractures and 43 were old cases and pseudarthroses. Resorption cavities, so-called vacuoles, were found in 31 cases. They were located in the proximal fragments in 2 cases, in the distal fragments in 11, and in both fragments in 18 cases. There were 3 compression fractures, 9 fractures of the tuberosity, and 79 transverse fractures and pseudarthroses.

The conservative treatment consisted of immobilization by an unpadded, circular plaster cast, in the neutral position of the wrist joint, and with free mobility of the fingers. Fresh transverse fractures were immobilized for from four to eleven weeks. The period of fixation was later gradually increased. After-treatment with baths and active motion was continued for two weeks.

On 5 patients with pseudarthroses or delayed consolidation of a transverse fracture, Beck's drilling

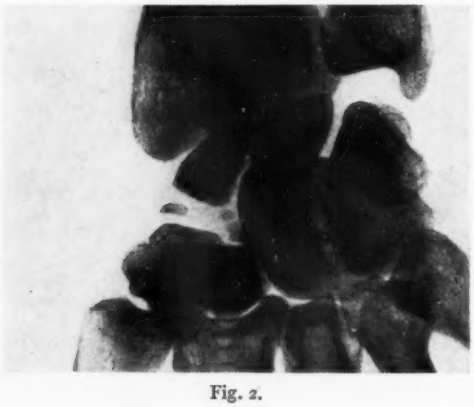

Fig. 2.

Fig. 3.

procedure was carried out, and a plaster cast applied for from six to twelve weeks. The operative treatment consisted of extirpation of a fragment. When the fragments were of different sizes, the smaller was removed, and if they were of equal size, the distal one was removed. For removal of the proximal fragment, arthrotomy was done through an axial incision along the ulnar border of the tendon of the extensor carpi radialis, and for removal of the distal fragment an axial incision was made in the snuff-box with a transverse incision through the joint capsule. The collateral ligament between the radius and carpus was not found. Following the operation, the joint was immobilized for only one week, after which baths and active motion were prescribed. Work could be resumed usually within four weeks.

The results of treatment were classified as good, moderately good, and poor. A good result denotes a painless joint and full working ability; in the conservatively treated and roentgen-controlled cases there is bony healing; the mobility is normal or almost normal; and the power is the same; there are no contractures. A moderately good result denotes slight subjective symptoms on exertion, and otherwise the same as the previous category. Poor results are those with pseudarthroses with or without arthritis, with no or only slight symptoms.

There were 3 compression fractures, 2 of which were followed up and the results pronounced good. The treatment had been fixation for two weeks. Of 9 fractures of the tuberosity, 8 were treated by immobilization for from two to four weeks in a plaster cast. One case was untreated. In 8 of these cases the results were good. In 1 case the results were less satisfactory and fifteen years later the patient complained of weakness and pains on exertion. The last case was one of intra-articular fracture, in which type the prognosis is not altogether good.

Most of the fractures of the navicular bone are transverse. If the fracture was of less than three

months' duration, fixation with a circular plaster cast was done. There were 31 such fractures. Of these 23 were cured and gave no further symptoms; bony healing was confirmed roentgenologically in 14. One result was less satisfactory. Seven cases showed poor results with pseudarthroses. Constitutional differences in addition to the changing pathological conditions of the fractures control the prognosis.

In 6 cases of old injuries and pseudarthroses, Beck's drilling procedure gave poor results. It was found that pseudarthroses developed and that the fragments were diminished in size by resorption. Old injuries sometimes heal well if immobilization is continued for several months. Six patients with pseudarthroses which were not treated had considerable symptoms.

None of the patients who were operated upon showed contracture of the wrist joint. Apparently, the leaving of one fragment prevents this complication, which is difficult to avoid after total extirpation of the navicular bone. When the proximal fragment is removed, the distal fragment tends to approach the os lunatum without contacting it (Fig. 1), but when the distal fragment is extirpated, there is no sign of "wandering" of the carpal bone or of the remaining proximal fragment and the stability of the wrist is well maintained (Figs. 2 and 3). Extirpation of the fragment generally results in ability to work and continued good health, after one month's continuous treatment, in at least 84 per cent of the cases, and continued full working ability in the remaining 16 per cent. Therefore the author believes that this operative treatment of older fractures gives better results than conservative treatment.

LOUIS NEUWELT, M.D.

Matti, H.: The Treatment of Navicular Fracture and the Refracture of the Patella by Filling with Cancellous Bone (Ueber die Behandlung der Navicularefraktur und der Refractura patellae durch Plombierung mit Spongiosa). *Zentralbl. f. Chir.*, 1937, p. 2353.

Fracture of the carpal navicular bone is often unrecognized and therefore non-union often develops. The treatment of the fresh navicular fracture is no longer under dispute; it consists of fixation in the customary way for from six to ten weeks and thereafter active exercise. In the stage of the so-called traumatic cyst formation one can obtain healing according to Boehler within four to eight months by immobilization of the wrist in a dorsal plaster splint. However, the fixation treatment of the fully developed non-union with occluded sclerotic bone surfaces has no rationale. As Schneck has shown, Beck's drilling operation under the fluoroscope can bring about bony healing. After operative removal of both navicular fragments there is a radial deviation of the hand and an incomplete return of function.

The author has evolved a new method, the filling of both fragments and the space between with fresh living cancellous bone, which already in 3 cases has given completely satisfactory results. Exposure of the navicular bone is made through a radiodorsal longitudinal incision over the radial epiphysis to the base of the second metacarpal. Preservation or notching of the dorsal carpal ligament is followed by exposure of the crossing of the tendons of the extensor carpi radialis brevis and the extensor pollicis longus with retraction of the tendons radially. The joint capsule is opened longitudinally, close to the lateral border of the tendon of the extensor carpi radialis. One then comes upon the navicular-lunate joint and finds the separation of the fragments. On the dorsal side the cartilage together with the cortex is nipped away and the fragments are hollowed out with a sharp curette. Finally, like the work of the dentist in inserting a gold filling, the filling with cancellous bone from the greater trochanter is undertaken, and that with suitable material. The spaces are completely filled; tight closure of the joint capsule is made. Removal of the cancellous bone through a longitudinal incision is done in a simple manner from the outer side of the trochanter.

The early filling with cancellous bone of the developing non-union of the navicular is the best prophylaxis for post-traumatic arthritis of the wrist joint. For the refracture of the patella in which similar circumstances come under discussion, Matti recommends the filling in a similar manner. For securing the fragments a tight cerclage of rustless steel wire is used to guard against further separation. The surrounding wire is removed in case of later trouble, but only after six months at the earliest and only after roentgen control. The original work contains 7 explanatory illustrations.

BARBARA B. STIMSON, M.D.

Munro, A. H. G., and Irwin, C. G.: Interlocked Articular Processes Complicating Fracture-Dislocation of the Spine. *Brit. J. Surg.*, 1938, 25: 621.

Three detailed case reports of fracture-dislocation of the spine with paraplegia and an associated interlocking of the transposed intact articular processes are presented. Radiographs taken before and after hyperextension therapy and after operative reduction, and a print showing the method of supporting the patient while lying in a plaster bed accompany the case reports.

It is suspected that the complication of interlocking of the transposed articular processes occurs with comparative frequency in cases of fracture-dislocation of the spine with paraplegia and that it goes unrecognized.

Fracture-dislocation of the spine with transposition of the articular processes is produced by indirect violence, and occurs most commonly in the lumbar region. The force, applied to the shoulders and upper thoracic area, is of such a degree as to cause disruption of the interspinous ligament, followed by a carrying forward of the upper dislocating vertebra over the vertebra below. Owing to the extreme flexion of the spine, the articular facets are

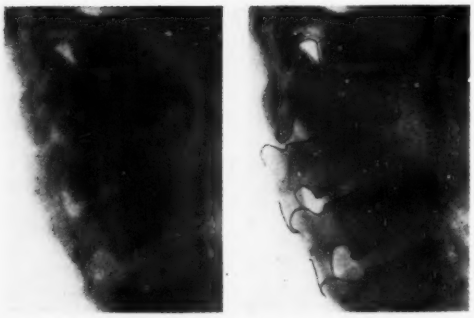

Fig. 1. Radiograph and tracing showing fracture-dislocation between the eleventh and twelfth dorsal vertebræ, with interlocked articular processes. Slight posterior compression of the eleventh vertebral body. Anterior compression of the twelfth vertebral body, and separation of a small anterior fragment. Slight anterior compression of the first lumbar vertebral body.

separated and the position of the processes transposed without a fracture occurring. The inferior processes finally come to rest upon the laminæ of the subjacent vertebræ, and in front of the corresponding superior processes. A compression fracture of the vertebral body below the dislocation is usually also present.

Paraplegia may be produced by concussion, edema of the cord or surrounding tissues, pressure of the extravasated blood, hematomyelia, and attenuation of the cord. The cord is not directly crushed in these cases, since the intact processes prevent it. Tension occurs, however, as the cord is stretched between the laminæ of the vertebra above and the posterior lip of the vertebral body below, so that rupture, partial or complete, may occur because of attenuation between these two points.

It will be evident from these remarks that any treatment, manipulative, longitudinal traction, or hyperextension, which tends to increase the tension of the attenuated spinal contents is contra-indicated. The prompt operative removal of one or both of the superior articular processes of the vertebra below the dislocation, however, offers a means of reduction without this disadvantage and with minimal disturbance to the patient. In most cases it is necessary to remove only a portion of the anterior part of each superior articular process to effect a reduction. This modification has the advantage of preserving the major portion of the processes and thus helps to maintain reduction and to increase the stability of the spine.

A description of the operative technique with comments on the difficulties encountered prior to, during, and following operation is given.

Ten cubic centimeters of a 1 per cent novocaine solution are injected over the kyphosis to prevent shock by virtue of relieving pain and muscle spasm. A sedative is also recommended.

ROBERT P. MONTGOMERY, M.D.

Funsten, R. V., Kinser, P., and Frankel, C. J.: Dashboard Dislocation of the Hip. A Report of 20 Cases of Traumatic Dislocation. *J. Bone & Joint Surg.*, 1938, 20: 124.

The authors report a series of 20 cases of traumatic dislocation of the hip. They select the name "dashboard dislocation" because it points out the mechanism by which most of these patients received their injuries. The person was usually sitting beside the driver of an automobile which came to an abrupt stop in a collision and his knee or tibia struck the dashboard panel forcibly; and since the hip was in a flexed and adducted position, the force of the impact was transmitted through the femur to the posterior rim of the acetabulum, and resulted in dislocation or fracture-dislocation of the hip.

The best results were obtained in fresh cases, with treatment by immediate closed reduction followed by traction. Simple dislocations were kept in traction for two or three weeks, while those with a formidable fracture of the acetabulum were held for about eight weeks. Active motion of the knee and hip was carried out during the period of traction. When the dislocation was more than a few weeks old, operation was required, the prognosis for a satisfactory result becoming poorer the longer the hip stayed out of place. The chief cause of permanent disability was absorption of the femoral head, which apparently results from injury to the nutrient arteries of the neck together with rupture of the ligamentum teres.

The authors include in their series a rare case of traumatic dislocation in a newborn infant as the result of podalic version in delivery. Reduction was easily accomplished under anesthesia and a spica cast was applied for ten days. Five years later the hip was apparently normal.

DANIEL H. LEVINTHAL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Lowenberg, E. L.: Varicose Veins Treated by Combined Ligation and Injection. *Surgery*, 1937, 2: 903.

Because the present popular method of treating varicose veins by the injection of sclerosing solution is simple and safe, inexpensive, and ambulatory, it appeals to both the physician and the patient. The author notes that when employed alone the method is followed by frequent recurrences, even more than those following the older operations of ligation, stripping, and excision. To avoid these recurrences and to facilitate primary obliteration by injections he describes a method of treating varicose veins by combined ligation and injection. In general he employs the injection method alone for simple cases with a negative Trendelenburg test, and radically high ligation and simultaneous injection, whenever the saphenous is dilated high in the thigh and whenever Trendelenburg's test is positive.

The normal anatomy of the venous system of the lower extremity is described and the changes in the varicose condition are outlined. A discussion of the examination of the patient is presented. Methods for treatment by ligation are suggested.

The contra-indications to combined ligation and injection are relatively few. Persistent occlusion of the deep veins constitutes a definite contra-indication. Nephritis, hyperthyroidism, and cardiac disease may make the procedure inadvisable. Pregnancy is not a contra-indication. To the contrary, high ligation influences favorably even varicosities of the vulva in pregnancy.

In his description of the technique of ligation and simultaneous injection of the saphenous vein at the femorosaphenous junction, the author stresses the importance of the removal of the saphenous stump and division of the branches usually encountered at the femorosaphenous junction. A transfusion cannula is inserted into the lumen of the vein. After fixation of the cannula 5 c. cm. of 5 per cent sodium morrhuate are injected into the lower end.

Finally, the author concludes that injection treatment of varicose veins is adequate for relatively small and isolated varicosities. Recurrences almost invariably result when this method is employed alone for larger varicosities directly related to the incompetent long and short saphenous vein. Such cases require interruption of the downward venous pressure at the so-called "blow-out" sites. Ligation of the long saphenous is performed ideally at the femorosaphenous junction, along with division of all tributaries encountered at this site. "Blow-out" sites lower in the leg require separate division below the lowest competent vein valve.

In the intelligent use of the tourniquet following the principles of the Trendelenburg test, rests the key to the discovery of the various "blow-out" points. Undue inflammatory reaction following combined ligation and injection can be prevented by a second ligation, lower in the leg, to limit the extent of the vein affected by the sclerosing solution.

Fig. 1. Radiograph with hippuran. A case showing secondary "blow-out" point below knee. Accessory branches are seen to be the cause of secondary dilatation.

If the principles of combined ligation and injection as outlined in this paper are followed, the treatment of varicose veins should remain simple, ambulatory, and attended by a minimum of recurrence.

HERBERT F. THURSTON, M.D.

Ochsner, A., and Mahorner, H. R.: The Modern Treatment of Varicose Veins. *Surgery*, 1937, 2: 889.

The authors' study is based upon 285 cases of varicose veins of the lower extremity among 9,000 patients admitted to the Hutchinson Memorial Clinic

of Tulane University, 247 of whom were females. Of the 247 females, 152 were treated in the Department of Obstetrics. The ratio of females to males in the entire series was 6.5 to 1, and the ratio of non-pregnant females to males was 2.5 to 1. Of the 247 females with varicosities, 62.6 per cent were pregnant. The average age of the males with varicose veins was forty-eight and one-tenth years and of the non-pregnant females forty-seven years, whereas the age of the pregnant females with varicosities was thirty and six-tenths years.

Of the 100 patients treated in the Department of Surgery, the circulation of the varicosities of the lower extremity was examined by three methods: (1) the Trendelenburg test, (2) the Perthes test, and (3) the combined tourniquet test previously described by the authors. The last test consists of observing the effect of walking on the filling or emptying of the varicosities and then placing a tourniquet at the upper, middle, and lower portions of the thigh, respectively, following which observations concerning the filling of the varicosities are made. In the cases in which the combined tourniquet test was used, 33 per cent had incompetence of the communicating veins as well as incompetence of the valves of the long saphenous vein, whereas in only 20 per cent was the doubly positive Trendelenburg test present.

The treatment of varicosities by injection alone has been disappointing, particularly in patients with large varicosities, because of their tendency to recur. There were 72 cases in which satisfactory results for comparison of the various methods could be observed. In 38 of the 72 cases, ligation and dissection of the vein were combined with the injection treatment. In the remaining 34, the injection treatment alone was used. In each instance 5 per cent sodium morrhuate was employed. Generally, 2 c.cm. of the solution were injected at one place, which usually resulted in thrombosis in an area varying from 2 cm. to 6 cm. or 9 cm. in length. Two or three injections were made. The injections were repeated at intervals of from five to seven days. A total of 55 ligations were performed in 38 patients. In 24, high ligations were done at the fossa ovalis and at the upper end of the internal saphenous vein above any of the tributaries. Twenty-six extremities were operated upon in the 24 patients. In 17, only high ligations of the internal saphenous vein were done in addition to the high ligation on one side. In 14 patients the ligations did not include high ligation of the internal saphenous vein, but other operations for section and ligation of the veins were done. It has been the authors' experience, however, that there is definite danger of recurrence unless high ligation is done.

In considering the type of therapy in the individual case, if the valves of the internal saphenous system are found to be incompetent, if the Trendelenburg test is positive, and if improvement is secured following application of the tourniquet at the upper, middle, and lower thirds of the thigh, ligation is recommended. In the milder cases of varicosities, injection treatment alone is used. A ligation should always be done high above all the tributaries of the saphenous system, because the authors have observed recurrences when the ligation of the saphenous vein was performed in the middle and lower thirds of the thigh. Cases of moderate or severe varicosity, as selected by the comparative tourniquet test, should have ligation and dissection below the level of the lowest communicating vein of the thigh with incompetent valves in addition to high ligation of the internal saphenous vein.

Ligation is done as an ambulatory procedure through a longitudinal incision 2 cm. medial to the femoral artery and 2 cm. below Poupart's ligament. The external pudendal vein is also ligated along with the internal saphenous. Following ligation the saphenous vein is divided and 2 c.cm. of 5 per cent sodium morrhuate are injected into the distal segment. Ligation should be done by means of transfixion. The patient is instructed to be ambulatory, as it is believed this encourages circulation in the deep veins of the lower extremity and helps prevent propagation of the thrombus through the collateral veins of the deep system. In cases in which the comparative tourniquet test shows that the patient has a leak not only through the main opening of the internal saphenous veins, but also through the communicating veins through the deep and superficial systems, the internal saphenous vein is also ligated at that point where the test shows that there is the greatest amount of improvement.

In a comparison of the results obtained from the injection treatment and those obtained from ligation and injection, it was found in a follow-up that the incidence of recurrence in the first group of patients was 57.5 per cent, whereas in the latter group it was 18 per cent. In those patients on whom ligation alone was done, the incidence of recurrence was 50 per cent.

Collens, W. S., and Wilensky, N. D.: Intermittent Venous Occlusion in the Treatment of Peripheral Vascular Disease: An Experience with 124 Cases. *J. Am. M. Ass.*, 1937, 109: 2125.

In attempting to determine the mechanism responsible for the clinical benefits obtained from constructive hyperemia, Lewis and Grant found that during the period of venous congestion produced by the application of a tourniquet, there occurred an increase in the arterial amplitude in their plethysmographic tracings. More important, however, was their observation that when the constricting band was released, an increase in arterial flow much out of proportion to the original resting period resulted. This they called reactive hyperemia. Circulatory arrest for a period of fifteen minutes would effect an increase in flow of as much as 600 per cent after release.

The authors, recognizing the above facts, decided to apply the principles in the treatment of peripheral vascular disease. This was done by the construction of an apparatus which automatically produced in-

termittent periods of venous compression and release of the compression. The apparatus was connected to a pneumatic cuff which embraced the proximal portion of the extremity. The cuff was inflated to a pressure necessary to constrict the veins and was then released. This cycle was then continuously repeated so that the final result consisted of alternating periods of venous congestion. The authors stress the fact that this method is not to be confused with the use of alternate suction and pressure in the treatment of the same type of diseases.

The remainder of the article deals with results of this form of therapy. The authors have treated a series of cases of thrombo-angiitis obliterans, arteriosclerosis obliterans (non-diabetic), arteriosclerosis obliterans (diabetic), and acute arterial occlusion. The results are given in several tables.

PAUL MERRELL, M.D.

BLOOD; TRANSFUSION

Guassardo, G.: Blood Dyscrasia with Osseous Alterations (Emopatie con alterazioni ossee). *Minerva med.*, 1937, 28:672.

The author reports a case of blood dyscrasia in a five-year-old girl of healthy parents. Born in normal labor, the patient's early history was found to be essentially negative. The newborn child was of normal weight and was breast-fed. The patient was well up to the age of six months when the mother noticed marked loss of weight and signs of malnutrition. This was accompanied by a marked facial pallor. At the age of ten months, the child had moderate elevations of temperature at various times and a physician diagnosed an anemia which was treated with arsenic.

At the age of two, the child was brought to the clinic with a fracture of the left femur which she sustained after an insignificant fall. At that time the physician reconfirmed the diagnosis of anemia.

For the last three years the child's condition did not improve; she presented a marked pallor, general asthenia, and anorexia. During the week previous to her admission to the clinic, the child presented a dry hacking cough, slight dyspnea, and a moderately elevated temperature.

Upon physical examination, the patient's state of nutrition was found to be poor and the mucous membranes were markedly pale. The skeletal system revealed the presence of long and thin bones, especially in the lower extremities.

Examination of the chest revealed subcrepitant râles over the entire pulmonary areas on both sides. There was a marked systolic murmur heard over the entire precordial area. The second pulmonary sound was accentuated.

The liver and spleen were found to be enlarged. The child died seventeen days after admission to the clinic. No autopsy could be performed.

The red-blood count a week before death was 1,390,000. The hemoglobin was 29 and the color index 1.1. The cells showed anisocytosis, poikilocytosis, and polychromatophilia. The nucleated red-cell count was 11,300. The white-cell count showed 4,600 polynuclears, 4,800 mononuclears, and 240,000 platelets. Three days before death the red count was 1,110,000 and the hemoglobin was 30. The number of nucleated red cells was decreased to 9,600.

Roentgenological examination of the skeleton revealed rarefaction of the bones in various places. Clinically, therefore, the case was characterized by an erythroblastosis, hyperhemolysis, and osseous alterations of the osteoporotic type.

The author states that in the literature, conditions involving both the blood and the bones have been described under a variety of names. Among these, the best studied are Cooley's erythroblastosis, Albers-Schoenberg disease, Hand-Schueller-Christian's syndrome, Niemann-Pick's disease, and Gaucher's disease.

In Guassardo's opinion this classification is impracticable because some of the cases run an atypical course and can therefore be classified only with difficulty. Although this present case probably represents one of Cooley's erythroblastosis, the absence of some of the symptoms and the atypical course make one doubtful. The author has therefore classified this condition on the basis of anatomicopathological criteria and has named it an "erythremic osteoporotic anemia."

RICHARD E. SOMMA, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Westberg, V.: A Statistical Study of the Fatalities from Pulmonary Embolism During the Years 1922 to 1934, Inclusive; Also of the Thromboses in the Year 1934 (Statistische Zusammenstellung der Todesfaelle an Lungenembolie waehrend der Jahre 1922–1934 sowie der Thrombosen im Jahre 1934). *Upsala Laekaref. Foerh.*, 1937, 43: 101.

Thrombosis with or without pulmonary embolism often prolongs the course of the disease and an embolus may even be fatal. Its unexpected appearance, apparently without cause, raises many questions, such as what is the essential nature of the thrombus, which biological processes lead to the formation of a thrombus and its growth, and what force tears the thrombus from its original site. None of these questions has been definitely answered.

Thromboses have been classified as follows: (1) local wound thromboses; (2) septic thromboses, (a) venous, (b) cardiac; and (3) progressive distant thromboses in the large veins. A sharp distinction is drawn between thrombophlebitis and thromboses. Distant thromboses owe their origin and structure to obstructions in the circulatory bed, such as venous valves and vessel branchings, which gives them a characteristic histological picture and makes it possible to definitely exclude the relatively harmless cases of thrombophlebitis.

The author's material consists of 104 fatalities from pulmonary embolism and thromboses from the Surgical Division of the University Hospital at Upsala, excluding cases of definite thrombophlebitis. Of these, 75 were postoperative and 29 non-postoperative. Of 79 thromboses in the year 1934, 49 were postoperative and 30 non-postoperative. The number of patients operated upon from 1922 to 1934 amounted to 19,574; those not operated upon to 18,055, which gives a mortality from pulmonary embolism of 0.38 and 0.16 per cent, in the two groups respectively. The thromboses in 1934 were also more numerous following operation (1,856) than in the absence of operation (1,667); the thrombosis morbidity was 2.63 per cent for the former and 1.79 per cent for the latter. Fatalities from pulmonary embolism often occur without even the existence of a thrombosis being suspected. In 80 cases (76.92 per cent) the embolus occurred without warning, and in only 24 cases (23.08 per cent) was the preceding thrombus confirmed or suspected. The clinical diagnosis of pulmonary embolism was made in 88 cases at autopsy and the site of the primary thrombus was found in 52 cases.

As to etiology, the literature does not differentiate between thrombosis and thrombophlebitis, which is a grave mistake. The latter occurs in the superficial and sinuous veins in contrast with the thrombosis which is localized in the straight and deep veins. Most authors cling to the infection theory, in which three factors are necessary: endothelial injury, blood changes, and changes in the blood stream, specifically retardation. There is disagreement, however, as to the importance of the individual factor.

Do any factors especially predispose to the formation of thrombosis and pulmonary embolism? Persons up and about very rarely develop distant thrombosis, which usually occurs as a complication of previous disease. The different factors seem to be of varied importance. Surgeons usually think of the operative trauma, but other causes include the primary disease, age, sex, and the social position. The author believes that operative trauma is a predisposing factor in thrombosis and pulmonary embolism. Any operation, even though relatively insignificant, attacks the biological life of the body, but it is difficult to decide which tissue and organic system is injured most. Tissue necroses, hemorrhage, and other operative traumas leave their traces on the constitution of the blood. Morphologically, the erythrocytes show no change except great loss of blood; the leucocytes show an increase in number and displacement to the left; the thrombocytes show immediate decrease in number, followed by a slow rise. Chemicobiologically, the globulin-albumin quotient is disturbed by an increased amount of globulin and the fibrinogen is increased. The postoperative increase in globulin predisposes to thrombus formation. The other blood changes include an increase in the residual nitrogen, creatinin and acidosis, but cholesterin shows no change, or a decrease, but never an increase. Of the blood reactions, sedimentation is accelerated, and viscosity and coagulability are increased. A diminished rapidity of the blood stream is an important causative factor in thrombosis.

Statistics show that thrombosis and pulmonary embolism occur more often after spinal anesthesia than after other methods of anesthesia, but this result is misleading because spinal anesthesia was used mostly in very debilitated and old patients, in whom thrombosis is dangerous.

Certain operations seem to be followed by thrombosis and pulmonary embolism more often than others, especially those below the diaphragm. Taking the diaphragm as the dividing line, the author found 70 pulmonary emboli in 18,612 operations (0.38 per cent) above it, and 1 embolus (0.06 per cent) below it. Opening of the peritoneum results in meteorism and diminished lowering of the diaphragm on respiration, and leads to thrombosis because of the poorer circulation. Among 14,033 laparotomies there were 48 pulmonary emboli (0.34 per cent), while in 6,129 there were 23 (0.39 per cent) emboli, which figures show practically no difference.

The greatest number of the fatalities from pulmonary embolism occurred between the fourth and

tenth days, most of them on the seventh, while the thrombosis occurs most often on the fourth and fifth day, but may occur at any time up to the fifty-second day.

The importance of the primary disease cannot be definitely determined. Clinical experience shows that markedly debilitated patients are more prone to develop these complications. There was a difference of 1.38 per cent between the incidence of these complications in tumors (1.78 per cent) and in diseases of the digestive organs (0.40 per cent); the difference between the incidence in tumors and in all fractures was 0.51 per cent. None of 400 patients operated upon for thyroid diseases showed a fatality from pulmonary embolism. Cardiac and vascular diseases favor the development of thrombosis and pulmonary embolism.

There is no marked difference in the incidence of these complications in the sexes. With increasing age the danger of thrombosis and death from pulmonary embolism increases. The mortality in private pavilions is about double that in general wards, on account of the greater age of the patients in the former.

In 23.08 per cent of the cases, pulmonary embolism followed a known cause, such as arrangement of the bedding, getting out of bed, or some other motion of the patient. In 76.92 per cent of the cases the embolus appeared without any such demonstrable cause: the patient may have sat up, turned in sleep, or simply not followed instructions to lie quietly. Of all the patients, 64.6 per cent died within a half hour, and 89.2 per cent within one day.

LOUIS NEUWELT, M.D.

Ettinger, A.: "Plate-Like" Atelectasis of the Lung. *Ann. Int. Med.*, 1938, 11: 1296.

Small areas of pure atelectasis without complicating secondary changes in the parenchyma are represented in the roentgenogram by "plate-like" shadows in the lung, which appear as horizontal stripes in both postero-anterior and lateral views (Fleischner). Previously, such horizontal stripes frequently have been mistaken for fibrinous deposits on the pluera. Fleischner observed these stripes associated with three groups of conditions:

1. Abdominal diseases.
2. After contusions of the chest.
3. Minor upper respiratory infections. By autopsy controls, he demonstrated that these plate-like shadows were due to small atelectatic areas.

The author observed the development of these shadows during the reëxpansion of a lobar infectious atelectasis in a number of children with typical acute lobar collapse due to upper respiratory infection. The horizontal stripes appeared in the roentgen-ray film during the stage of re-inflation. They represented at this time the only abnormal finding. Clinically, the health of the patient seemed to be fully restored.

A case of acute lobar collapse due to upper respiratory infection is reported in which, in the end stage of reëxpansion, thin horizontal shadow stripes were seen in the area previously collapsed, and were interpreted as "plate-like" minute areas of atelectasis which were caused by the occlusion of small-sized bronchi.

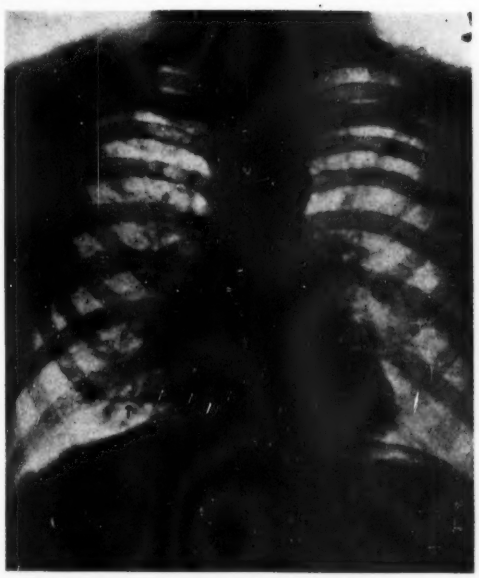

Fig. 1. Arrows indicate a horizontal shadow stripe in the right lower lobe, which represents "plate-like" atelectasis.

In the differential diagnosis, pleural adhesions alone have to be considered. The appearance of the atelectatic areas as thin stripes in both the anterior and lateral films makes it obvious that we are dealing with a plate-like and not with a linear structure. The intrapulmonary origin is therefore evident.

Fleischner explains the appearance of these plate-like shadows by a mechanism which he calls "directed collapse." While in pneumothorax the lung can retract from the lateral chest wall, because of the change of pressure within the chest cavity, conditions for collapse in obstructive atelectasis are fundamentally different. In this condition the lung cannot retract from the chest wall. Even if no pleural adhesions are present, the negative pressure acts as an adherent force between the surface of the lung and the chest wall and prevents the collapse of the lung toward the hilus. As there is no possibility for the lung to shrink in a costomediastinal direction, as in pneumothorax, the tendency of the atelectatic area to diminish in extent can take place only in a craniocaudal direction, perpendicular to the axis of shrinkage in pneumothorax.

JOHN H. GARLOCK, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Schmidt, H.: The Serum Prophylaxis of Tetanus (Zur Serumprophylaxe des Tetanus). *Med. Welt*, 1937, 604.

Tetanus bacilli are found less frequently in the earth than Fraenkel bacilli. Just like diphtheria bacilli, not every tetanus bacillus forms the same amount of toxin. Traumatic tetanus, although of varying frequency in different areas, may be carried with modern transportation to areas heretofore uninfected. Therefore, every transportation injury must be considered as infected. The nature of the wound has no significance. It may appear very slight and superficial, but nevertheless surgical wound disinfection is one of the most important prophylactic factors. The omission of the prophylaxis with serum is a grave mistake in all street injuries and soiled wounds. It should be used as soon as possible, and the longer the interval after the accident, the greater must be the amount of the antitoxin. Formerly, 20 German antitoxin units were given. Such a unit corresponded to 150 of the International units. At the present time from 2,500 to 3,000 International units are given. Among the sera, there are now available 500-fold and 2,000-fold horse serums, of which 5 and 1.5 c.cm., respectively, are necessary for prophylactic purposes. There is also a cattle serum of from 250 to 500-fold of which 10 and 5 c.cm., respectively, represent the necessary protective amounts. A 500-fold horse serum with only 5 per cent albumin may be obtained also.

Serum sickness must in no case be a hindrance to the prophylaxis. It occurs in from 30 to 40 per cent of the cases and depends upon the reaction of the individual. It may be prevented in several ways: (1) the Rother auto-blood injection of 30 c.cm. of venous blood within the first twelve to twenty-four hours, possibly with the addition of sodium citrate, 1.5 c.cm. of a 3.8 per cent solution for each 10 c.cm. of blood; (2) by the injection of 10 c.cm. of serum from a person, who from four to eight days previously has undergone serum sickness, before the tetanus serum injection of Panzat and Levy; and (3) by the procedure of Buzello, in which at the beginning of the disease from 2 to 5 c.cm. of the same serum are injected immediately; this is not quite harmless in persons who have previously been given any kind of serum injection as the Arthus phenomenon may appear. The best and simplest remedy is the use of the somewhat expensive 2,000-fold horse serum or of serum poor in albumin. Serum sickness is not avoided by a previous desensitizing injection; such an injection can prevent only shock. Anaphylactic shock should be avoided under all conditions, and to this end the following are important: (1) a carefully taken history to determine whether any kind of serum injection has been given before, or whether there is a tendency to asthma, hay fever, urticaria, migraine, and edemas in the patient himself, or his parents, his brothers, and sisters; (2) the testing for hypersensitivity either by the eye or skin test. In the eye test 1 drop of the serum diluted 1 to 10 is dropped into the conjunctival sac. Within from one-half to two hours there results itching, lacrimation, and edema of the lid. In the skin test an intracutaneous wheal is made with the serum diluted 1 to 10 c.cm. Within ten minutes there results a wide wall with extensive erythema in the vicinity with characteristic pseudopod-like processes in the adjacent area. There are persons who do not tolerate horse serum, and to these cattle serum must be given. The desensitization is carried out by the technique of Besredka, by injecting from 0.5 to 1 c.cm. subcutaneously, and only after three or four hours the necessary amount, namely, the 2,000-fold horse serum or cattle serum is injected. In conclusion, the author recommends the active immunization against tetanus by means of an aluminum-hydroxide absorbed tetanus toxoid. Rodenwalds has never seen a serious injury from the prophylaxis in the tropics.

Zeissler reports that fatalities from serum disease and anaphylactic shock are extremely rare. With the extensive travelling, and the possibility of previous infection of the skin with tetanus spores, only little consideration should be given to the fact that the particular region in question is not infected. In the presence of foreign bodies, such as wood splinters, injections should always be given, also in secondary operations of old injuries, as the spores may be viable after twenty years or more.

Buerkle de la Camp claims that if a wound can be entirely excised within ten hours, the injections need not be given. If, however, an excision is not possible, only a toilet can be made, or if the wounded patient comes later than ten hours after the accident, injection must be given. Even slight injuries unfortunately often produce an infection. He never saw a fatality.

Hempel claims that injection should be given after wound excision within from six to eight hours and rivanol, 1 to 1,000, should be injected in all wounds soiled with street dust, dung, wood, and garden soil, and in barefoot walkers with injuries. The smallest and superficial scratch wounds of the skin are dressed with balsam of Peru. After eight hours he also excises a wound, but gives a double dose of tetanus antitoxin. In old war injuries, 1 c.cm. of cattle serum is always given during the operation under anesthesia and four hours later the proper dose is slowly injected. Serum sickness is relatively rare. In one case the patient's own blood helped. A paralysis was seen once. Anaphylactic shock was never seen. (Franz). Louis Neuwelt, M.D.

ANESTHESIA

Pouliquen, E.: General Anesthesia with Sodium Evipan (Anesthésie générale à l'évipan sodique). *Mém. l'Acad. de chir.*, Par., 1937, 63: 1217.

Pouliquen notes that intravenous anesthesia is but little employed in France as compared with its

more widespread use in other countries. In the past three years, he has employed sodium evipan, given by intravenous injection, as the anesthetic for 2,300 operations. Most of these operations were of relatively short duration. In these 2,300 operations serious symptoms developed in a few cases and there were 2 deaths which may be attributed in part to the anesthesia. One death occurred in a man seventy-two years of age operated upon for intestinal obstruction; local anesthesia was used, but a small dose of evipan was also given, which was a mistake. The second death occurred in a woman, who was an alcoholic, when evipan was employed for a curettage. In this case too large a dose of evipan was employed, especially because evipan is undoubtedly dangerous to alcoholics. Evipan was often used for patients who were in a poor condition, when the author would have hesitated to employ any other form of general anesthesia.

The author considers evipan, given in a single injection for operations of short duration, a safe and simple anesthetic in most cases. The administration of evipan by repeated injections for longer operations is a different matter. This requires a skilled anesthetist and a careful technique. He has used this method, however, for gastrectomy in 6 cases with very satisfactory results; in these cases a small amount of numal was added to the evipan.

When evipan is employed by the usual technique, the patient usually goes to sleep quietly in a few minutes after the injection. Usually a dosage of from 6 to 10 c.cm. is required, but some patients do not need more than 1½ or 2 c.cm. In most cases the patient is quiet—the author observed restlessness or agitation in only three or four cases—and awakes without malaise. However, the patient should not be allowed to move about immediately, even after minor operations under evipan.

Evipan can also be used to good advantage to supplement other methods of anesthesia, either before or after the other anesthesia is given. If used before the other anesthetic, the dosage required of the latter is definitely reduced; the patient's anxiety and the sensation of suffocation with inhalation anesthesia are relieved. Evipan can also be given at the end of certain operations, especially when local or spinal anesthesia is not quite sufficient to bring the operation to a close.

A very small dose of evipan can be employed for such minor surgical procedures as the incision of an abscess, and removal of adherent dressings. With the usual dose, giving a deeper anesthesia, it can be employed for such procedures as uterine curettage, cleansing and suturing of traumatic wounds, cystotomy, prostatectomy, drainage of some cases of pleurisy, ileostomy, and for some operations for appendicitis. For the latter operations some supplementary anesthetic may be required. Evipan is especially valuable for the treatment of injuries, including the reduction of fractures. The author suggests that this use of evipan may prove very valuable in war surgery. ALICE M. MEYERS.

Bloch, J. C., Rolland, P., and Vieillefosse, R.: Intravenous Injection of Scopolamine, Morphine, Narcotine, and Ephedrine, as a Supplementary Analgesic in Local Anesthesia (Injections intraveineuses de scopolamine, morphine, narcotine, éphédrine: analgésie complémentaire de l'anesthésie locale). *Anes. et anal.*, 1937, 3: 484.

In animal experiments, Bloch and his associates have shown that the depressive effects of a mixture of scopolamine and morphine on the respiration and circulation can be counteracted by a subsequent injection of a mixture of narcotine, which stimulates the respiratory center, and ephedrine, which acts primarily on the cardiovascular system. When the four drugs were combined in a single injection, the respiratory rhythm and blood pressure were but slightly modified, unless injections were often repeated. The animals recovered promptly from the effects of even repeated injections.

The authors have used intravenous injections of this combination of drugs as a supplement to local anesthesia in 48 cases with good results. The mixture used contains 5 mgm. morphine, ½ mgm. scopolamine, 25 mgm. each of ephedrine and narcotine per 2 c.cm. The intravenous injection is given slowly; it takes about two minutes. An injection of from 1 to 2 c.cm. is given half an hour before operation; if the patient is not asleep or complains during the course of the operation (under local anesthesia) a second injection may be given, but the total amount used should not exceed 4 c.cm. While too large a dose induces complete loss of consciousness, it may make the patient restless and agitated, especially at the time of suturing the wound, so that the use of a small amount of a general anesthetic may become necessary. This occurred twice in the authors' experience.

As a rule, the patient is quiet after the injection, and shows a tendency to go to sleep; this is not an "anesthetic sleep," as he rouses sufficiently to answer questions. The blood pressure shows little change; the pulse may be somewhat accelerated but remains strong and of good quality throughout the operation. The postoperative recovery is usually excellent, as is the rule under local anesthesia. ALICE M. MEYERS.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Ratti, A.: The Radiological Picture of Malignant Lymphogranuloma of the Lung (Il quadro radiologico del linfogranuloma maligno del polmone). *Radiol. med.*, 1937, 24: 907.

Ratti states that malignant pulmonary lymphogranulomatous lesions have been described anatomicopathologically and roentgenologically, but the literature on this subject is very scarce.

Anatomicopathologically and pathogenetically, lymphogranulomas are to be considered as inflammatory lesions caused by an unknown agent. Any organ may be affected but those organs which contain elements belonging to the reticulo-endothelial system are involved especially.

In the lung, like in other parenchymatous organs, a malignant granuloma presents itself in the form of nodules or masses of various sizes. The surrounding parenchymatous tissue is undergoing exudative, proliferative, and sometimes also degenerative changes. Morphologically these lesions may be classified into: (1) nodular mediastinobronchial lesions with direct involvement of the lung, or involvement by way of the hilus through the medial pleuropulmonic surface; (2) nodular mediastinobronchial lesions with extension into the lung by the peribronchial or intrabronchial route; (3) diffuse pulmonary infiltrates with more or less lobar distribution and with involvement of the bronchomediastinal lymph glands; (4) circumscribed and confluent lobular lesions with involvement of the lymph glands; and (5) diffuse pulmonary lymphohematogenous lesions involving the lymph glands primarily.

The last form occurs most rarely. From a radiological point of view, malignant lymphogranulomatous lesions of the lung are classified by Ratti into (a) infiltrating mediastinopulmonary forms, and (b) forms with isolated pulmonary foci associated or unassociated with a tumor of the hilus or the mediastinum.

The infiltrating mediastinopulmonary forms are most frequently encountered. Generally speaking, the roentgenological picture reveals a more or less extensive pulmonary opacity which is continuous with the mediastinal shadow and is altered by the presence of more or less well distinguishable lymphoglandular nodes. This type of roentgenological picture may be encountered in various phases of this condition.

The forms with isolated pulmonary foci occur less frequently in the author's experience. In the majority of the cases the roentgenological picture reveals multiple nodules of various sizes. It is rare to find only an isolated single pulmonary focus although such cases have been described in the literature. It is also very rare to encounter multiple minute foci scattered over the entire pulmonary area. In the presence of miliary lesions the roentgenological diagnosis is considerably difficult and the condition is easily confused with miliary tuberculosis.

In the author's material no cases with the formation of cavities and bronchiectasis have been observed although some investigators have described their presence in this condition. Ratti has observed, however, in many cases the presence of pleural lesions in the form of moderately extensive effusions and adhesions at the site of the lymphogranulomatous lesions.

After having compared the results obtained from roentgenological examination with the anatomicopathological findings, the author discusses the differential diagnosis which includes primarily bronchopneumonia, lobar pneumonia, and pulmonary tuberculosis.

Concerning the prognosis, Ratti believes that the multiple nodular forms are especially resistant to irradiation and therefore particularly dangerous.

RICHARD E. SOMMA, M.D.

Overend, T. D.: The Significance of Appendix Radiology. *Brit. J. Radiol.*, 1937, 10: 829.

During recent years the rational interpretation of signs revealed by the roentgen examination of the appendix has not altogether kept pace with technical improvements. The importance attached to these signs in establishing the diagnosis of chronic appendicitis varies widely. The vague and elusive current clinical and pathological concepts of appendiceal disease are largely responsible for the lack of a satisfactory guide to the comprehension of the roentgen findings. The solution lies in promoting this examination to a scientific procedure based upon an understanding of underlying principles.

With this in mind the author discusses the physiology, etiology and pathogenesis, clinical features, and "appendix-radiology" at some length. He cites concepts advanced by various authors which tend to show that this organ probably aids in coping with sepsis in the alimentary canal. Intrinsic infections, abnormal excitation of the abdominal sympathetic system resulting in vascular spasm, involutional changes, and social environment may contribute to perversion of the normal function. Adhesions, scar tissue formation, and other changes demonstrable by biopsy probably represent defense reactions.

Acute appendicitis is generally regarded as being outside the sphere of roentgenological investigation. This holds true as far as the use of contrast media is concerned, but plain roentgenograms may serve to prevent diagnostic errors by revealing other etiological factors, such as urinary concretions which may cause similar symptoms.

"Chronic appendicitis" is not accepted as a disease entity generally, but is variously interpreted as representing the after-effects of an acute attack, or

Fig. 1. Woman, eighty-two years of age. Severe abdominal pain and vomiting for some months. Pain was centralized on right iliac fossa and umbilicus. Pain increased by solid food. Barium meal showed well-marked "cardiospasm" and esophageal delay. The appendix is seen to be extremely long, to have a kink or obstruction in its middle, its proximal half is dilated, and its distal half narrowed. Much tenderness on palpation.

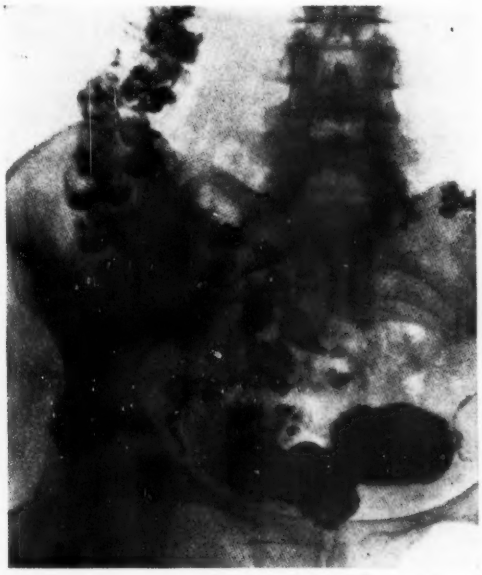

Fig. 2. Woman, fifty-three years. For three years attacks of "secondary dyspepsia" with nausea and some vomiting. Appendix seen to be long, tortuous, and with a terminal filling-defect; tender and fixed on palpation. No gastric abnormality seen. Typical chronic appendicitis with "appendix-dyspepsia."

being in the nature of recurring attacks with a residual chronic infection. These cases frequently present problems of differential diagnosis in which the roentgen examination may be of great value by demonstrating pathological changes produced by the diseased appendix or revealing other or associated lesions which may have an important bearing on the symptomatology.

The roentgenological aspects of appendix examination are discussed relative to direct signs produced by intrinsic changes in the appendix and secondary changes of a morphological or functional nature referred to as indirect signs. Technique is discussed briefly in connection with both the opaque meal and enema methods of examination, and special procedures are mentioned which have been advocated to improve the results. Attention is called by the author to the advantages to be derived from an examination by means of the enema during the subsidence of a subacute attack, at which time positive findings may be elicited which are less obvious at a later period.

Of the direct signs, luminal changes in the form of irregular narrowing, dilatation, or imperfect filling are the most important. Segmentation is of trivial importance as it may be due to active contraction. Filling defects due to coproliths or other causes are also negligible as they are usually accidental. Stasis of the appendix may be due to an organic cause, but it occurs also in normal cases and its presence as a predisposing factor deserves consideration. Non-visualization as a sign of pathology is discussed. Attention is called to various conditions in which it may have diagnostic value and others in which it is merely an accidental finding.

Many indirect signs have been described as being due to chronic appendicitis, but the etiological relationship of some of them is questionable. Most of them should be evaluated in correlation with the clinical manifestations. Localized tenderness over a visualized appendix is usually considered of definite value, but even in the absence of such a shadow tenderness around the cecum may be significant. Demonstrable fixation, kinking, or malposition may all be due to adhesions from a previous attack of appendicitis and may have an important bearing on the diagnosis. Elongation of the cecum or ascending colon, chronic volvulus of these parts, deformities and mucosal pattern variations of the cecum, ileal kinks, and calcification of the ileocecal group of glands are mentioned as morphological signs of importance. Among functional changes, ileocecal stasis, inhibition of the gastro-ileus reflex, ileal spasm, pylorospasm, and evidences of spasticity of the colon are stressed as being of value in some cases.

The importance attached by different authors to the signs mentioned is cited. Commonly this is in accord with their conception of what constitutes

"chronic appendicitis." Some authors have grouped several of these signs as syndromes characteristic of the condition. Overend has made no attempt to draw definite conclusions but believes that the tentative deductions made by him demonstrate that there are principles on which a trustworthy examination of the appendix may be based.

ADOLPH HARTUNG, M.D.

Hernaman-Johnson, F.: The Place of X-rays in the Treatment of Certain Forms of Chronic Arthritis. *Brit. J. Radiol.*, 1937, 10: 765.

Roentgen therapy has been found to be of definite value in certain forms of chronic arthritis, but comparatively little has been done to classify the particular forms amenable to such treatment. Believing this to be essential for statistical purposes, the author gives a detailed clinical and radiological description of those forms in which roentgen rays should be given a trial. For the limited purpose of arriving at a prognosis, he classifies joint lesions into monarthritis and polyarthritis, and divides the former into hypertrophic and infective forms.

He has found roentgen therapy especially valuable in hypertrophic cases, except in the degenerative types affecting very old individuals in whom it is valueless. Even when the involved joint presents well marked changes and these remain stationary or appear to progress during treatment, there may be definite improvement clinically, providing no predisposing factors are left out of account and the treatment is persisted in sufficiently.

The affected joint is given 150 roentgens twice a week for three weeks (first series). If some lessening of pain results, the same treatment is continued for a further three weeks. If, however, no relief at all occurs, the dosage in the second series of six treatments may be increased to 300 roentgens per sitting. The author uses 180 kv., 0.5 copper filter, 40 cm. a-k skin distance, a field of from 25 to 30 cm. in diameter, and anteroposterior, postero-anterior, and lateral areas. At least 2 more full courses of 12 sittings should be given at intervals of three months, no matter how well the patient feels; and thereafter less frequently for from two to three years. If improvement at the end of six weeks is small or absent, it is nevertheless desirable to persist as some cases showed real relief only after eight or nine months.

In cases of infective arthritis the dosage must be very carefully graded according to the amount of active inflammation present. In the chronic stages, the same dosage may be used as in the hypertrophic form. Temporary improvement is perhaps the rule, but genuine arrest is hard to attain.

In polyarthritis, roentgen rays applied locally to individual joints may give some temporary relief, but the progress of the disease is not checked.

ADOLPH HARTUNG, M.D.

MISCELLANEOUS

Hartman, F. W.: Lesions of the Brain Following Fever Therapy: Etiology and Pathogenesis. *J. Am. M. Ass.*, 1937, 109: 2116.

This study was undertaken in order to determine whether the lesions produced during the course of artificial fever therapy were due to asphyxia or anoxia. The material was from 1 human being who died and 15 experimental animals. In the latter careful blood studies were carried out which showed that there was marked diminution of the oxygen content of the animal's blood, viz., the arterial blood showing an oxygen content of 15.59 per cent, an oxygen-carrying capacity of 26.65 per cent, or an oxygen saturation of 59 per cent.

The minute cellular changes and the areas of necrosis observed in these brains after fever therapy are the histological changes observed after cerebral anoxia produced by ligation of the blood vessels, carbon-monoxide poisoning, and asphyxia. Contributing factors to the anoxia include alkalosis of the blood due to rapid respirations, increased temperature of the blood with decreased oxygen saturation, increased basal metabolism with increased oxygen demand on the part of the tissues, and very rapid flow of the blood through the tissues so that the oxygen is not given up in passing.

To combat these factors the use of oxygen during the period of treatment is recommended. It should be given by nasal catheter and, in order to combat the alkalosis, combinations of oxygen and carbon dioxide are suggested. JOHN WILTSIE EPTON, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Hicks, Sir S.: The Physiology of Acute Circulatory Failure Due to Hemorrhage and Shock. *Australian & New Zealand J. Surg.*, 1937, 7: 99.

The author quotes Holt's definition of primary shock as a circulatory collapse due to inhibition of constrictor tone by influences operating throughout the central nervous system. It is rapid in onset and associated with a fall in the blood pressure but without a decrease in the blood volume. So far as secondary shock is concerned, Holt summarized Blalock's work, ascribing the condition to a reduction of the blood volume due to loss of blood and/or plasma into the injured tissues, which lead to a decreased cardiac output and a fall in the systemic pressure. Prolonged vasoconstriction may further reduce the blood pressure and so establish a vicious circle. The difference between primary and secondary shock is so clear cut in a period of time as to offer no difficulty in differentiation.

The author goes on to give an excellent review of the pathological physiology of shock. He calls attention to the importance of the depot function of the spleen, great veins, and subpapillary plexus of the skin, as well as the importance of the pulmonary circulation in serving as a buffer depot, between the right and left sides of the heart. The fundamental physiology of cardiac output is carefully reviewed. The importance of an effective coronary blood supply is stressed inasmuch as cardiac muscle unlike skeletal muscle is unable to go into temporary "oxygen debt." The clinical signs of primary and secondary shock and hemorrhage are discussed in some detail. The important literature on the subject of the physiology of these conditions is reviewed.

The principles underlying the treatment and prevention of shock of hemorrhage are the maintenance of the circulatory blood volume, the avoidance of extra demands upon the circulation, and the mitigation or avoidance of any influence likely to stimulate the sympathetico-adrenal system or to undermine the metabolic resistance of tissue cells. One of the most important factors under the first heading is dehydration. The large fluid loss from the body in the form of invisible perspiration and by water vapor from the lungs, as well as that resultant from intestinal disturbance must be considered. Such losses should be added to the blood or plasma loss. The osmotic pressure of the plasma protein should be restored with blood or imitated by gum saline solution. Under the second heading must be considered measures to insure warmth and to prevent any movement due either to pain or apprehension. Quiet is essential. It is necessary to prevent heat loss but not to heat the patient. Attempts to raise the blood pressure temporarily by a vasoconstrictor are not only unnecessary in secondary shock, but unfavorable. The important thing is to restore to the heart a good venous return. In primary shock, however, these measures are quite justified. The decision as to when to use morphine must be based upon clinical experience, the powerful depressant effect of the drug upon the respiratory center being kept in mind. The intravenous use of strophanthin or of digitalis is manifestly of no value. Most rigid hemostasis must be observed because further loss of blood may very suddenly precipitate the subject into a condition of severe shock.

HAROLD C. OCHSNER, M.D.

Meyer, A. W.: Use Destruction in the Human Body. *California & West. Med.*, 1937, 47: 375.

Observation of the effects of friction upon the hair, nails, skin, and teeth is inescapable, but the internal evidences of attrition have been largely overlooked. This neglect is ascribed by the writer to the fact that anatomists alone have the full opportunity to observe such changes. It is an old assumption that human joints are frictionless, that hyaline cartilages do not wear, and that slight injuries of joint structures are quickly repaired during customary periodic rests. Although complete repair might

Fig. 1. A right supraspinatous tendon (above) reflected laterally and viewed from below, to show the marked fraying of the synovial membrane, the articular capsule and the undersurface of the tendon from contact with the wholly normal and smooth cartilaginous margin of the head of the humerus.

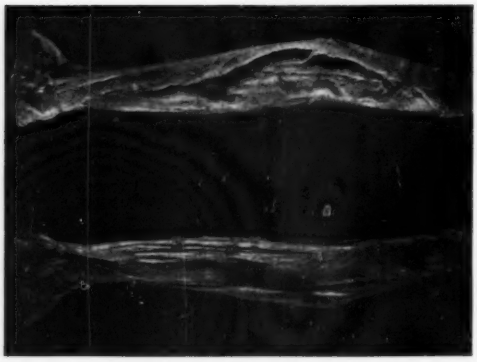

Fig. 2. A pair of biceps tendons illustrating the greater wear in the right (upper) tendon in right-handed persons.

occur in such highly vascular structures as synovial bursæ and articular capsules in the young, regeneration in the practically avascular hyaline and fibrous cartilage is another matter. In any event, the result depends upon the relative rates of repair and wear and only secondarily upon the age, vascularity, structure, and nutrition of the organ in question. Healing cannot occur in avascular, hyalinized, separated tags of capsules, ligaments, and tendons.

In regard to joint mice, for example, the violent movement causing and the acute symptoms accompanying them, as well as the pathological process present, are well known, but the facts that many joint mice are symptomless and that movement can increase their number are commonly overlooked. The microscopic and macroscopic particles contained in synovial fluid are not all derived from hyaline cartilage, but come from the capsules, ligaments, and fibrocartilage as well, and under unusual conditions may arise from the muscles. These particles, like the larger joint mice, also have a traumatic origin since they are the product of attrition.

The following changes, believed to have a similar origin, are described: (1) fraying and destruction of the walls of synovial bursæ, commonest in such superficial bursæ as those overlying the olecranon and the patella and in such deep bursæ as those above the shoulder (Figure 1); (2) fraying on the inner surfaces of articular capsules, the commonest change within joints, which can be pronounced in a joint which is otherwise perfectly normal (Figure 2); (3) articular capsule defects, most frequent in the shoulder, the acromioclavicular, and the hip joints; (4) destruction of ligaments, as the division occurring during the formation of large defects in the related portions of joint capsules; (5) fraying of muscles from movable contact with each other and from such contact with other structures through defects in joint capsules; (6) fraying and partial or total division of tendons, most commonly and seriously of the supraspinatus and the long tendon of the

Fig. 3. Fissuring of the hyaline articular cartilage on the distal extremity of a right femur with slight fraying of the former.

brachial biceps; (7) the gradual dislocation of tendons as in case of the long tendon of the biceps; (8) destruction of fibrocartilages, such as the almost universal fraying in later years of the inner margins of the glenoid fibrocartilages; (9) destruction of hyaline articular cartilages (Figure 3), as in the intercondylar regions of the femur and on the patella; (10) fissuring of the intervertebral discs, commonly present in the later decades; (11) erosion of bone with possible destruction of coapted bones to a depth of centimeters in such locations as the knee and hip joints; (12) rupture of the tendons; and (13) the formation of bony excrescences.

Important articular structures may be weakened or severed by the attrition accompanying ordinary routine movements in the course of daily life. The important factor is the frequency of the motion and not the greatness of the range. Healing, whenever possible, can occur only when the processes of repair exceed those of destruction. Probably even pronounced destruction can occur from attrition without severe pain if the rate of erosion is sufficiently slow. This does not imply that infection may not supervene. WALTER H. NADLER, M.D.

Furth, J., Kahn, M. C., and Breedis, C.: The Transmission of Leucemia of Mice with a Single Cell. *Am. J. Cancer*, 1937, 31: 276.

Numerous experiments have been performed to determine the number of cells necessary for the

transmission of malignant tumors of mice. These studies indicate that more than 100,000 cells are necessary to transmit mouse carcinoma and mouse sarcoma. These experiments, however, have not been made with inbred animals, and it is probable that under favorable conditions a much smaller number of neoplastic cells would transmit the disease. The authors have found that under favorable conditions both lymphoid and myeloid leucemia can be transmitted with an estimated number of from 1 to 100 cells.

It seemed desirable to obtain more accurate information concerning the relation of the number of cells introduced to the duration of the disease and the character of the lesions produced. This information was obtained with the aid of the micromanipulator and is the subject of this communication.

In the experiments described a small number of mice inoculated with single leucemic cells developed leucemia. These mice died within from fifteen to fifty days. This finding indicates that if leucemia results from the malignant transformation of a single normal leucocyte, the mice will die within that period. When mice received a dose larger than approximately 20 cells, all of them died of leucemia; but inoculations with smaller numbers of cells were successful only in a small percentage of the inoculated animals. This result may be explained by assuming that many of the cells used for inoculation were not viable, and that many cells were lost or injured during the process of inoculation. It may be assumed, furthermore, that not all cells are capable of reproduction and that cells which do not reach an organ favorable for their growth perish. The latter assumption is supported by the finding that with several strains of leucemia subcutaneous inoculations with a large number of cells fail to produce the disease, while intravenous inoculations made with a smaller number of cells are successful.

Attempts were made to transmit mouse leucemia with cell-free material and with injured cells; the cell-free material to be injected was examined microscopically and the cells were crushed while watched under the microscope. Failure to transmit the disease in these experiments supports the assumption that transmission of mouse leucemia is due to the implantation of living leucemic cells into susceptible hosts.

Leucemia may be explained by assuming that at least a single cell undergoes malignant transformation in an adult individual. In mice developing leucemia at the age of from seven to fifteen months, this transformation may take place within from four to seven weeks before the death of the animal. A single malignant white blood cell is capable of producing the systemic disease, leucemia, which has hitherto been regarded by many workers as having a multicentric origin. The transmission of mouse leucemia occurs as a result of the implantation of living malignant leucocytes.

JOSEPH K. NARAT, M.D.

Weiner, H. A.: Paget's Disease of the Skin and Its Relation to Carcinoma of the Apocrine Sweat Glands. *Am. J. Cancer*, 1937, 31: 373.

Paget's disease, both mammary and extramammary, was first described in 1874, but its nature is still disputed. An instance of the disease occurring in the vulva of a woman eighty-four years old is reported with detailed necropsy findings. Of 57 other extramammary cases in the literature, no necropsy report is available and only 15 are reported in sufficient detail to warrant a definite diagnosis. An additional 10 are probably Paget's disease. The present case is strongly corroborative of the view of Jacobaeus, Muir, and others as to the nature of Paget's disease. They maintain that the skin lesion is the result of intra-epidermal metastases from an underlying cancer; i.e., the "Paget cell" is a cancer cell. All of the acceptable extramammary cases are located either in the axilla or anogenital region, sites in which the sweat glands are of the apocrine variety. The mammary glands are also modified sweat glands. It is suggested that Paget's disease of the skin is the intra-epidermal metastasis from an underlying carcinoma of the apocrine sweat glands. It is noteworthy that in the reported extramammary cases the carcinoma, whenever characterized, is described as glandular in type.

Is there more than a historical validity to justify the assumption that Paget's disease is either a clinical or pathological entity? It would be rash at the present time to give a definite answer, but even if the skin lesion is not completely *sui generis*, the view that this disease, which is linked with an underlying adenocarcinoma, and occurs at specific sites, such as the breast, axilla, and anogenital region, is a specific clinicopathological entity would seem to be warranted.

JOSEPH K. NARAT, M.D.

Welch, C. E., and Nathanson, I. T.: Life Expectancy and Incidence of Malignant Disease. IV. Carcinoma of the Genito-Urinary Tract. V. Malignant Lymphoma, Fibrosarcoma, Malignant Melanoma, and Osteogenic Sarcoma. *Am. J. Cancer*, 1937, 31: 586, 598.

The average length of life in untreated cases of carcinoma of the cervix is fourteen months, of the bladder fourteen months, and of the prostate twelve months. The average length of life in all treated cases of carcinoma of the vulva is thirty months, of the vagina twenty-four months, of the cervix twenty-seven months, of the fundus of the uterus forty months, and of the ovary twenty-two months. The length of life remaining to young patients with carcinoma of the cervix is shorter than that remaining to older patients. Adeno-acanthoma, which is a mixed epidermoid and adenocarcinomatous growth, appears to be intermediate in malignancy between cancer of the cervix and cancer of the fundus of the uterus. The average length of life in treated cases of carcinoma of the penis is seventy-five months, of the testicle twenty-four months, of the prostate twenty-six months, of the

bladder twenty-seven months, and of the kidney twenty-two months.

There appears to be no significant variation in the length of life remaining to patients with Hodgkin's disease and to those with other types of malignant lymphoma. The average length of life remaining in Hodgkin's disease is thirty months, and in the other types, twenty-four months. All malignant disease primary in the lymphatic system is considered under the heading of malignant lymphoma. This includes lymphocytomas, lymphosarcomas, Hodgkin's disease, and the tumors diagnosed as giant follicular-cell lymphoma, of which there are very few examples.

The average length of life remaining to patients with chronic leucemia, either lymphatic or myelogenetic, is about forty months. Acute lymphatic leucemia was more common than the acute myelogenetic type in this series. Treatment prolongs the life of patients with malignant lymphoma about six months. The average length of life remaining to patients with fibrosarcoma is forty-three months, with malignant melanoma thirty-nine months, and with osteogenetic sarcoma twenty-one months. The prognosis in malignant lymphoma in the early years is slightly better for females than for males.

JOSEPH K. NARAT, M.D.

DUCTLESS GLANDS

Loeser, A.: Hyperthyroidism and the Thyrotropic Hormone of the Hypophysis. *Proc. Roy. Soc. Med.*, Lond., 1937, 30: 1445.

Hyperthyroidism may be produced in two ways: by the administration of the thyroid hormone, and by the administration of the thyrotropic hormone of the anterior pituitary. The thyrotropic hormone, when injected into the thyroids of young guinea pigs, causes a decrease in the amount of colloid and a growth of the acinar cells resembling human Graves' disease. It is inactive when given by mouth. Changes occur in from one-half hour to twelve hours following the injection. There are no other hormones of the anterior pituitary lobe which produce changes of this type.

The thyrotropic hormone is standardized in Junkmann-Shoeller, or in Rowland-Parkes units, the latter being thirteen times larger than the former. The injection of this hormone in guinea pigs causes a rise in the basal metabolic rate of from 20 to 60 per cent; when injected in rats and humans the rise is 26 per cent within six to ten days. The glycogen content of the liver falls, but the blood sugar and muscle glycogen are little changed. Water, urea, and sodium chloride are excreted, and tachycardia is observed, though none of these effects are observed in thyroidectomized animals.

The effectiveness of the hormone is limited. In hypophysectomized rats, for instance, the basal metabolic rate, which rose to plus 28 per cent, began to fall by the end of the first week and was minus 29 per cent after five weeks. The explanation for these phenomena varies. Some investigators believe that the thyroid becomes refractory to the thyrotropic hormone, others believe that the thyroxin, when liberated in excessive amounts, inhibits the secretion of the thyrotropic hormone by the pituitary; but because it was also observed in hypophysectomized animals, Collip and Anderson advanced the idea of antihormones. Antihormones can be clearly demonstrated in all animals after from four to nine weeks' treatment with the thyrotropic hormone, but are present in small quantities also in the blood of normal animals and human beings.

The anti-thyrotropic hormone is not species specific. Its production is bound to the presence of thyroxin or of the thyroid. Iodine is without effect. This anti-thyrotropic hormone is specific against thyrotropic hormones only. It does not inhibit other pituitary hormones, thyroid extract, or thyroxin.

This dual protective mechanism, namely, the decreasing of production of thyrotropic hormones by the pituitary and a production of antibodies, can be overridden by an increase in the amounts of thyrotropic hormone, which can lead to an increased and, finally, fatal hypothyroidism.

The size of the thyroid in these animals increased about 500 per cent, and even the adrenals increased 140 per cent. The basal metabolic rate increased 70 per cent and was maintained in some animals until death. The liver and kidneys showed a fatty degeneration and diffuse necrosis.

Hyperthyroid states can be conceivably produced by the pituitary, either by a continuously increasing stimulation of the thyroid gland with the protective mechanism intact, or by a constant stimulation with failure of the protective mechanism.

FRED S. MODERN, M.D.

JUNE, 1938

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